

PC WORLD

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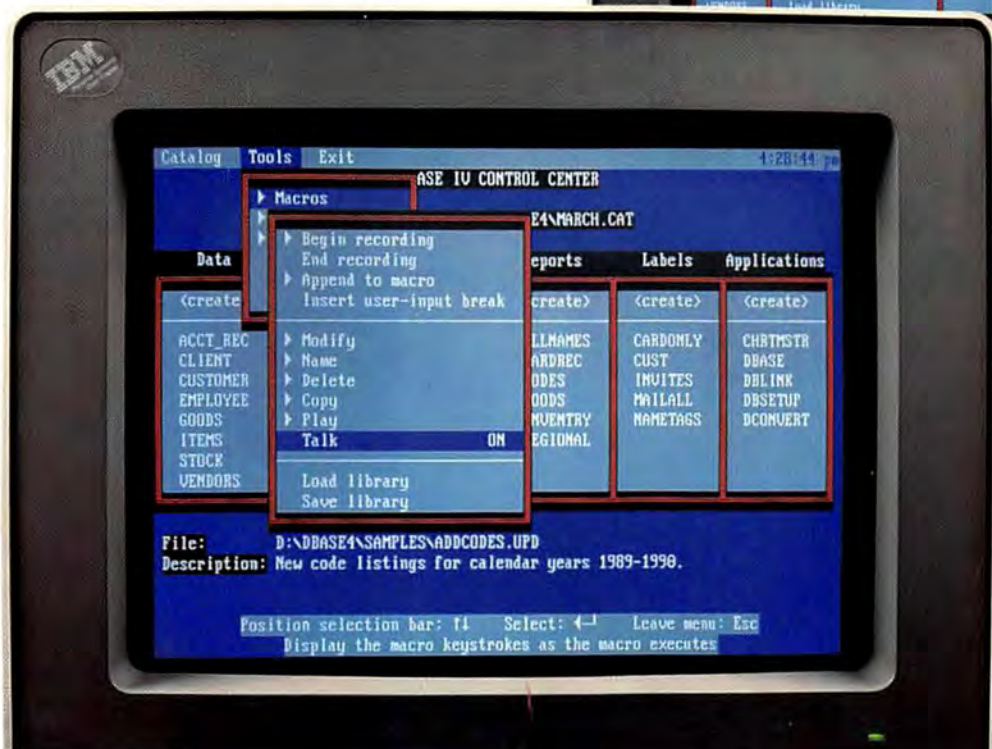
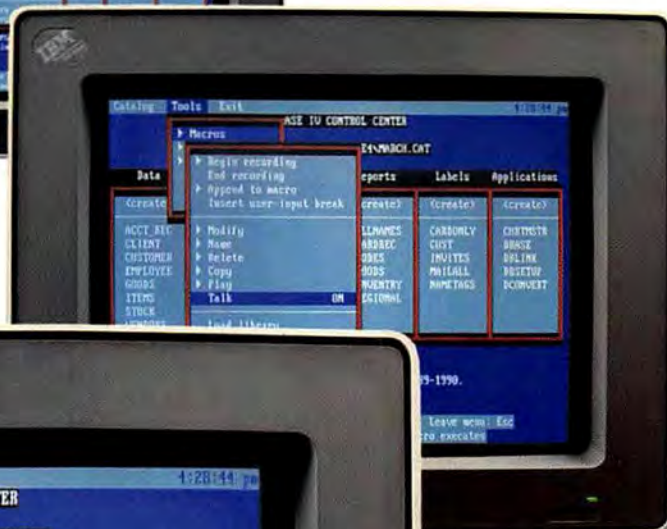
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- WRITE CASL PROGRAMS

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THE DELL 20 MHz 286 SYSTEM 220.

It's an 80286 system that's as fast as most 386 computers. But at less than half the price. Which means you get the best price/performance of any system. The System 220 runs at 20 MHz, with less than one wait state. It also features complete compatibility with Microsoft MS-DOS and MS OS/2, plus a remarkably small footprint. The System 220 is the ideal executive workstation.

STANDARD FEATURES:

- 80286 microprocessor running at 20 MHz.
- 1 MB of RAM* expandable to 16 MB† (8 MB† on system board).
- Page mode interleaved memory architecture.
- LIM 4.0 support for memory over IME.
- Integrated diskette and VGA video controller on system board.
- Socket for Intel 80287 math coprocessor.
- One 3.5" 1.44 MB diskette drive.
- Integrated high performance hard disk interface on system board.
- Enhanced 101-key keyboard.
- 1 parallel and 2 serial ports integrated on system board.
- 3 full-sized industry standard expansion slots available.

OPTIONS:

- External 5.25" 1.2 MB diskette drive.
- 3.5" 1.44 MB diskette drive.
- Intel 80287 math coprocessor.
- 1 MB RAM upgrade kit.
- **Lease for as low as \$85/Month.

System 220 Disk Drives	With Monitor	
	VGA Mono	VGA Color Plus
One Diskette Drive	\$2,299	\$2,599
40 MB-29 ms Hard Disk	\$2,999	\$3,299
100 MB-29 ms Hard Disk	\$3,799	\$4,099



THE DELL 12.5 MHz SYSTEM 200.

A great value in a full-featured AT compatible. An 80286 computer running at 12.5 MHz, this computer is completely Microsoft MS-DOS and MS OS/2 compatible. The System 200 offers high speed drive options, industry standard compatible BIOS and on-site service. As Executive Computing said of this computer's predecessor, "If faster processing speed and low cost are two key issues affecting your purchase decision, this machine might be the ideal choice for your office."

STANDARD FEATURES:

- 80286 microprocessor running at 12.5 MHz.
- 640 KB of RAM expandable to 16 MB† (4.6 MB† on system board).
- Socket for Intel 80287 math coprocessor.
- 5.25" 1.2 MB or 3.5" 1.44 MB diskette drive.
- Dual diskette and hard disk drive controller.
- Enhanced 101-key keyboard.
- 1 parallel and 2 serial ports.
- 200-watt power supply.
- 6 industry standard expansion slots.

OPTIONS:

- Intel 80287 math coprocessor.
- 512 KB RAM upgrade kit.
- **Lease for as low as \$99/Month.

*PERFORMANCE ENHANCEMENTS (SYSTEMS 325, 310 AND 220):

640 KB is available for programs and data. The remaining 384 KB is reserved for use by the system to enhance performance.

†Using 1 MB SIMMs. Inquire as to availability.

System 200 Hard Disk Drives	With Monitor & Adapter	
	VGA Mono	VGA Color Plus
40 MB-28 ms	\$2,699	\$2,999
90 MB-18 ms ESDI	\$3,499	\$3,799
150 MB-18 ms ESDI	\$3,999	\$4,299
322 MB-18 ms ESDI	\$5,999	\$6,299

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The obvious companion for a high performance Dell system is a Dell laser or dot matrix printer. All printers come with 30-day money-back guarantee. And be sure to ask about our software offerings, which include most popular third-party applications as well as Dell Enhanced operating system software.

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Laser System 150, 15 pages per minute:	\$5,995.
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All Dell laser printers come with 1.5 MB RAM, full-page 300 DPI graphics, and have 31 standard fonts (7 resident and 24 down-loadable from diskette). Dell laser printers also provide Hewlett-Packard LaserJet, Epson/FX, IBM Proprinter and Diablo 630 emulations.

DOT MATRIX PRINTERS.

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Our highest resolution text and graphics, 24-pin dot matrix printer. Draft quality at 200 cps. Letter quality at 66 cps. Parallel and serial interfaces. Wide carriage.	
Printer System 600:	\$499.95.
9-pin dot matrix. Draft quality at 240 cps. Near-letter quality at 60 cps. Parallel interface. Wide carriage.	
Printer System 300:	\$199.95.
9-pin dot matrix. Draft quality at 144 cps. Near-letter quality at 36 cps. Four standard fonts. Parallel interface. Narrow carriage.	

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Dell Enhanced Microsoft® MS-DOS® 3.3:	\$99.95
Dell Enhanced Microsoft MS-DOS 4.0:	\$119.95
(Both MS-DOS versions with disk cache and other utilities)	
Dell Enhanced MS® OS/2 Standard Edition 1.0:	\$324.95

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For the complete terms of our On-Site Service Contract, Satisfaction Guarantee, Warranty and leasing plans, write: Dell Computer Corporation, 9505 Arboretum Blvd., Austin, Texas 78759-7299.



THE NEW 25 MHz
386 SYSTEM 325.

When you need the highest possible performance of any 386, this is the technology of choice. Running at 25 MHz, the System 325 is faster than the Compaq 386/25. Besides unequalled speed, it also offers Intel's Advanced 82385 Cache Memory Controller and high performance disk drives. As a result, it gives you workstation-level performance for CAD/CAM and desktop publishing applications. It's also especially effective as a network file server, and more than capable of handling the most complex spreadsheets and databases.

STANDARD FEATURES:

- Intel 80386 microprocessor running at 25 MHz.
- 1 MB of RAM* expandable to 16 MB using a dedicated high speed 32-bit memory slot.
- Advanced Intel 82385 Cache Memory Controller with 32 KB of high speed static RAM cache.
- Page mode interleaved memory architecture.
- VGA systems include a high performance 16-bit video adapter.
- Socket for 25 MHz Intel 80387 or 25 MHz WEITEK 3167 math coprocessor.
- 5.25" 1.2 MB or 3.5" 1.44 MB diskette drive.
- Dual diskette and hard disk drive controller.
- Enhanced 101-key keyboard.
- 1 parallel and 2 serial ports.
- 200-watt power supply.
- 8 industry standard expansion slots.

OPTIONS:

- 25 MHz Intel 80387 math coprocessor.
 - 1 MB or 4 MB memory upgrade kit.
 - 2 MB or 8 MB memory expansion board kit.
- **Lease for as low as \$245/Month.**

System 325 Hard Disk Drives	With Monitor & Adapter	
	VGA Mono	VGA Color Plus
150 MB-18 ms ESDI	\$6,799	\$7,099
322 MB-18 ms ESDI	\$8,799	\$9,099

The Dell System 325 is an FCC Class A device, intended for business use only.



THE DELL 20 MHz
386 SYSTEM 310.

For business users who need a 386 system, this is the best combination of performance and value available. Running at 20 MHz, this 32-bit system is faster than the IBM PS/2 Model 70 and the Compaq 386/20e. Since it has the same high performance disk drives and Intel Advanced 82385 Cache Memory Controller as our System 325, it brings a new level of performance to complex spreadsheets and databases. As you might expect, it runs windowed software at extremely high speed. It's also well-suited for desktop publishing applications, or as a network file server.

STANDARD FEATURES:

- Intel 80386 microprocessor running at 20 MHz.
- 1 MB of RAM* expandable to 16 MB using a dedicated high speed 32-bit memory slot.
- Advanced Intel 82385 Cache Memory Controller with 32 KB of high speed static RAM cache.
- Page mode interleaved memory architecture.
- VGA systems include a high performance 16-bit video adapter.
- Socket for 20 MHz Intel 80387 or 20 MHz WEITEK 3167 math coprocessor.
- 5.25" 1.2 MB or 3.5" 1.44 MB diskette drive.
- Dual diskette and hard disk drive controller.
- Enhanced 101-key keyboard.
- 1 parallel and 2 serial ports.
- 200-watt power supply.
- 8 industry standard expansion slots.

OPTIONS:

- 20 MHz Intel 80387 math coprocessor.
 - 1 MB or 4 MB memory upgrade kit.
 - 2 MB or 8 MB memory expansion board kit.
- **Lease for as low as \$140/Month.**

System 310 Hard Disk Drives	With Monitor & Adapter	
	VGA Mono	VGA Color Plus
40 MB-28 ms	\$3,899	\$4,199
90 MB-18 ms ESDI	\$4,699	\$4,999
150 MB-18 ms ESDI	\$5,199	\$5,499
322 MB-18 ms ESDI	\$7,199	\$7,499

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Our 386-based systems are priced about 35% less than comparable systems—like Compaq's. Which may make you wonder if we've left something important out. Like high performance.

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In fact, these are among the fastest 386-based systems available. With more advanced features than you'd get in systems that list for up to \$3000 more.

Like Compaq's.

For instance, our 20 MHz System 310 offers you the best value available in any 386-based system. PC Magazine (6/14/88) describes it as "fast enough to burn the sand off a desert floor."

AND IF THAT SOUNDS FAST, WAIT TILL YOU SEE OUR NEW 25 MHz 386-BASED SYSTEM.

At 25MHz, our new System 325 offers you the highest possible performance in a 386. Like the System 310, it utilizes the very latest technology, including the Intel 82385 Cache Memory Controller, advanced 32-bit architecture and high performance drives. And of course, both systems are fully IBM PC compatible. (For more detailed specifications, see the inside pages.)

But speed isn't the only reason to buy from us. Or even the best reason.

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Dell configures systems to your own personal specifications. After an

evaluation of your needs, we'll help you select the features that are right for you. After your system unit is custom built, we'll burn-in everything, add-in boards and all, to make sure the entire system works perfectly.

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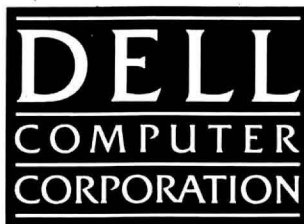
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AND IF YOU STILL THINK YOU GET WHAT YOU PAY FOR, CONSIDER THIS.

When you buy or lease from Dell, you buy directly from our manufacturing facility in Austin, Texas. Which means we eliminate dealer markups, allowing us to give you a lot more 386 for less.

This same principle is behind all the Dell systems. Review them in detail. Then call us at (800) 426-5150 to order the system that's right for you.



REVIEWS



dBASE users can breathe a sigh of relief—the long-awaited upgrade has finally arrived. Our review of dBASE IV begins on page 94.

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- Almost any program prints on a PostScript printer with *Trading Post*
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Letters. Letters should be mailed to the address given above, *e/o* Letters. All letters must include the writer's name, city, and state. They should not exceed one double-spaced typewritten page. We reserve the right to edit letters.

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Circle 108 on reader service card

Zen and the Art of Network Maintenance



Associate Editor
Eric Brown and
Contributing Editor
David Ferris

Local area networks complicate life, overwhelming even experienced managers with intricate maintenance requirements. When LANs are involved, expert assistance is not only welcome, it's virtually essential. That's the spirit behind a *PC World* department that debuts this month.

In *Network Q&A*, Contributing Editor David Ferris will deal with the practical concerns of network managers. The amiable British native, who holds degrees in mathematics and philosophy, commands impressive fees for his lectures on corporate PC networking. His San Francisco-based firm, Ferris Network Integration, provides network configuration, maintenance, and training services for clients of all sizes.

Despite those high-powered credentials, Ferris hasn't forgotten the needs of down-to-earth PC managers. Most businesses, he argues, can't afford to develop in-house network expertise, and retail PC channels don't offer the added value that LAN buyers need.

In terms of day-to-day PC support, Ferris says his firm's customers "already have strong in-house technical skills. Ideally, we can take charge of the specialized network issues, freeing up the in-house support staff to deal effectively with the concerns of the

end users and the specific needs of the business."

PC World readers can expect the same relationship with *Network Q&A*. Associate Editor Eric Brown, who edits the column, says that the key to its success will be translating Ferris's considerable expertise into terms users can understand. "Like most *PC World* readers," Brown explains, "I've got plenty of experience with PCs and almost none with networks. It's the editor's job to select questions that will appeal to a wide cross section of readers, and to keep the answers focused on the needs of managers."

We're confident that *Network Q&A* will become a primary source of information for anyone dealing with LANs.

Also in this issue: You've got data base questions, we've got answers. Should you switch to an OS/2 version of your favorite relational data manager? Don't decide until you've read "OS/2 Data Bases: First Steps." Is *dBASE IV* worth the wait? Read William Urschel's in-depth review to find out. And have you ever wondered how to build a data base from scratch? Richard Scoville ("How to Design a Data Base") offers some valuable tips and techniques. We also feature a look at point-of-sale systems, a roundup of affordable accounting packages, a buyers' guide to PC and XT accelerator boards, and previews of Lotus's *Magellan* and Borland's *SideKick for Presentation Manager*. ●

Ed Bott

Ed Bott
Managing Editor



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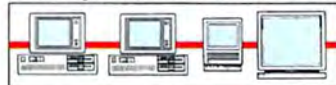
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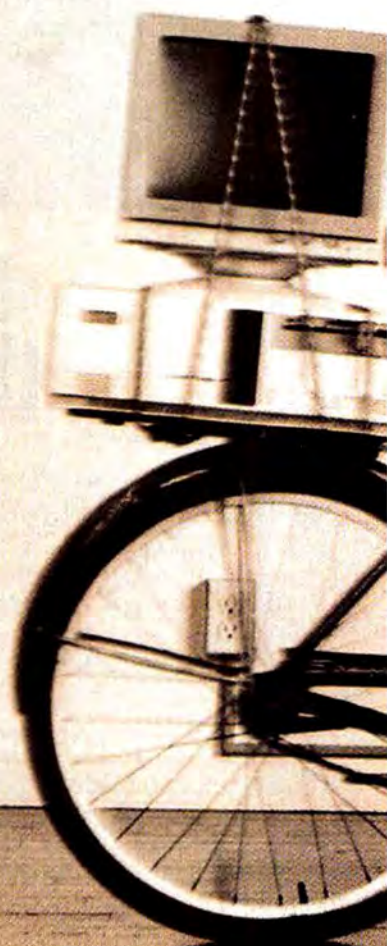
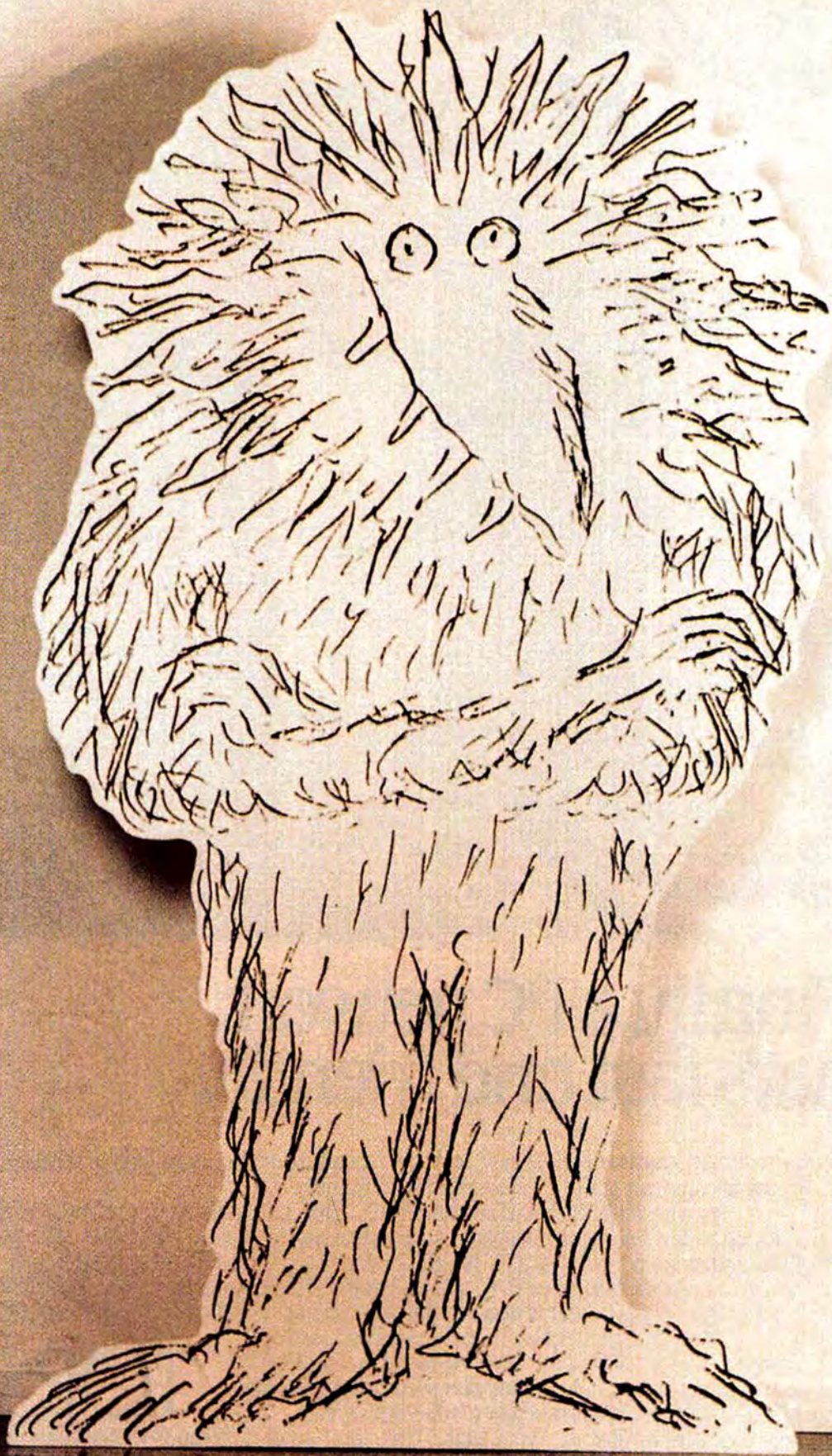
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TOP OF THE NEWS

Release 2.x to Endure

*Lotus Will
Continue to
Enhance Most
Popular PC
Program*

Contrary to the widespread expectation that 1-2-3 release 3.0 will replace the current release 2.01, Lotus Development Corporation has settled on a two-pronged strategy for keeping 1-2-3 the most popular PC package on the market. Although Lotus refuses to give details, it is expected to introduce an upgrade to release 2.01 this spring, probably before a June debut of release 3.0. "Release 3.0 will be our flagship product for those within work groups needing powerful consolidation," says a Lotus spokesperson. She acknowledges, however, that "there is a segment that needs a product like release 2.x." Recent statements made by Frank Ingari, general manager of Lotus's spreadsheet divi-

sion, imply that the 2.x line will be aimed at users with PCs, XT's, and low-end AT's who create only moderate-size worksheets and don't need 3.0's enhanced graphics and ability to open, link, and consolidate multiple worksheets. Many other 3.0 features are already available in release 2.01. In recent months, Lotus has given registered users utilities to remove copy protection, record macros, perform minimal recals, and drive PostScript printers and VGA displays. Additionally, Lotus has instituted a dealer promotion offering Funk Software's *Always* graphic/font enhancement with new sales of release 2.x. All 2.01 enhancements are logical candidates for inclusion in any new 1-2-3 release.

**HyperCard-Like Package
Comes to the PC**

*Low-Cost Tool
Makes Pro-
grammers of
the Rest of Us*

Brightbill-Roberts in Syracuse, New York, introduced an IBM-compatible equivalent of Apple Computer's *HyperCard* in late February. A \$99 program comparable to that shipped with every Macintosh since August 1987, *HyperPad* lets users create hypertext data bases, or pads. These are composed of "stacks" of forms whose fields can be linked with similar or dissimilar fields among the same or different pads. For instance, a name field can be linked by a "button" to any of the fields in a series of invoices, thus revealing a history of customer purchases. Hypertext proponents suggest that this nonrelational linking more closely mirrors the way humans think than do other data base schemes. *HyperPad* is intended for nonprogram-

mers who want data bases customized to their way of working or for creating training applications in which users can wander from topic to topic at will. *HyperPad*'s object-oriented form painter can be used to cut and paste a screen's worth of fields. That code is written automatically but can be modified for reuse with an English-like scripting editor. *HyperPad* has lower memory and processor requirements than either *HyperCard* or upcoming *Windows*-based competitors, maintains principal Steve Brightbill, because its user interface employs character-based rather than bit-mapped graphics. "You can have hundreds of forms in memory at any time, whereas you can have only a couple of cards in memory on a Mac," he maintains.

Translator Developed

*Micrografx
Introduces
Graphics File
"Rosetta
Stone"*

Any day now, Micrografx will introduce a graphics utility to convert graphics files back and forth between various object-oriented and bit-mapped formats. Micrografx president George Grayson describes the product, code-named *Passport*, as "a kind of graphics Rosetta stone" similar in operation to several utilities that translate word processing file formats. Initially, *Passport* will transfer between CGM, Macintosh Pict1 and Pict2, *AutoCAD* .DXF, and Micrografx's own .DRW formats. Within six months, the Richardson, Texas, firm hopes to add the *GEM Draw* format from Digital Research and Adobe's PostScript EPS format. "We are going slow because we want to offer as true a translation as possible," says Grayson. "We support CGM the way that *Harvard Graphics* does

and the way that *Freelance* does and the way that the ANSI committee specifies." Grayson expects *Passport* to retail for \$295 to \$395. The utility also will be offered in version 2.0 of Micrografx's *Designer*, due to ship in March. That version will read object-oriented code and write bit-mapped color TIFF images—a capability scheduled for a future *Passport*. Eventually, Micrografx hopes to propose a wider-reaching graphics interchange/editing specification to the Windows Presentation Manager Association. Users of *Windows* and Presentation Manager applications that included the Integrated Document Environment Architecture specification then could "click on" a graphic, and the appropriate graphics editor would pop up.

HP Is Back

*Mini Maker
Resurrects Its
Retail PC
Business*

Although Hewlett-Packard is one of the world's largest computer companies, its name has not exactly struck fear into the hearts of other PC makers. But during the past year, HP has begun to leverage the success of its market-leading LaserJet, ThinkJet, and plotter lines to help PC sales. This struggle began in 1985 when HP began to put together a complete line of Vectra desktops and laptops and convince more of the 2500 dealers who carry its peripherals to take on Vectras. During the past year, HP has more than doubled its number of authorized PC dealers—to 650—and tripled revenues from PCs sold through them. With direct

and system manufacturer sales, HP's overall PC revenues grew 45 percent in 1988, while its unit sales more than doubled. "If you add up the dollars from sales of both our PCs and peripherals through U.S. dealers, we are the number three supplier behind IBM and Apple," asserts Bob Puett, general manager of HP's PC Group. His group claims 5 percent of the worldwide PC business and sets new sales records every month. HP plans to continue to shift its focus away from its mini client base and toward retail. At the end of January, HP announced new 20-MHz and 25-MHz cached 80386 systems and an 80286-based laptop.

OS/2 WordPerfect Ships

*Word Processor Advances
Toward
Presentation
Manager*

The first OS/2 version of a market-leading, major application will appear this month, as WordPerfect Corporation delivers *WordPerfect 5.0 for OS/2 1.0*. Product Manager Chuck Middleton describes the word processing package as an "intermediate step" toward a Presentation Manager version, due out by year-end. *WordPerfect 5.0 for OS/2 1.0* costs \$549, compared with \$495 for the DOS version; its main advantage is the ability to open more than two document files simultaneously. The company plans to let users upgrade to the PM version for about the price difference between DOS and OS/2 1.0 versions, reports Middleton. The PM release will

abandon the familiar function-key-controlled design in favor of a graphic user interface much like *WordPerfect for the Macintosh*. While the new release will generally have the same functionality as the DOS program, an edit mode will reveal documents just as they will be printed, complete with font styles, graphs, and special treatments such as underlines. Also added will be support for a mouse and Dynamic Document Exchange, so that a data base table or spreadsheet range brought into a document will maintain its "live" links with the file from which it was imported.

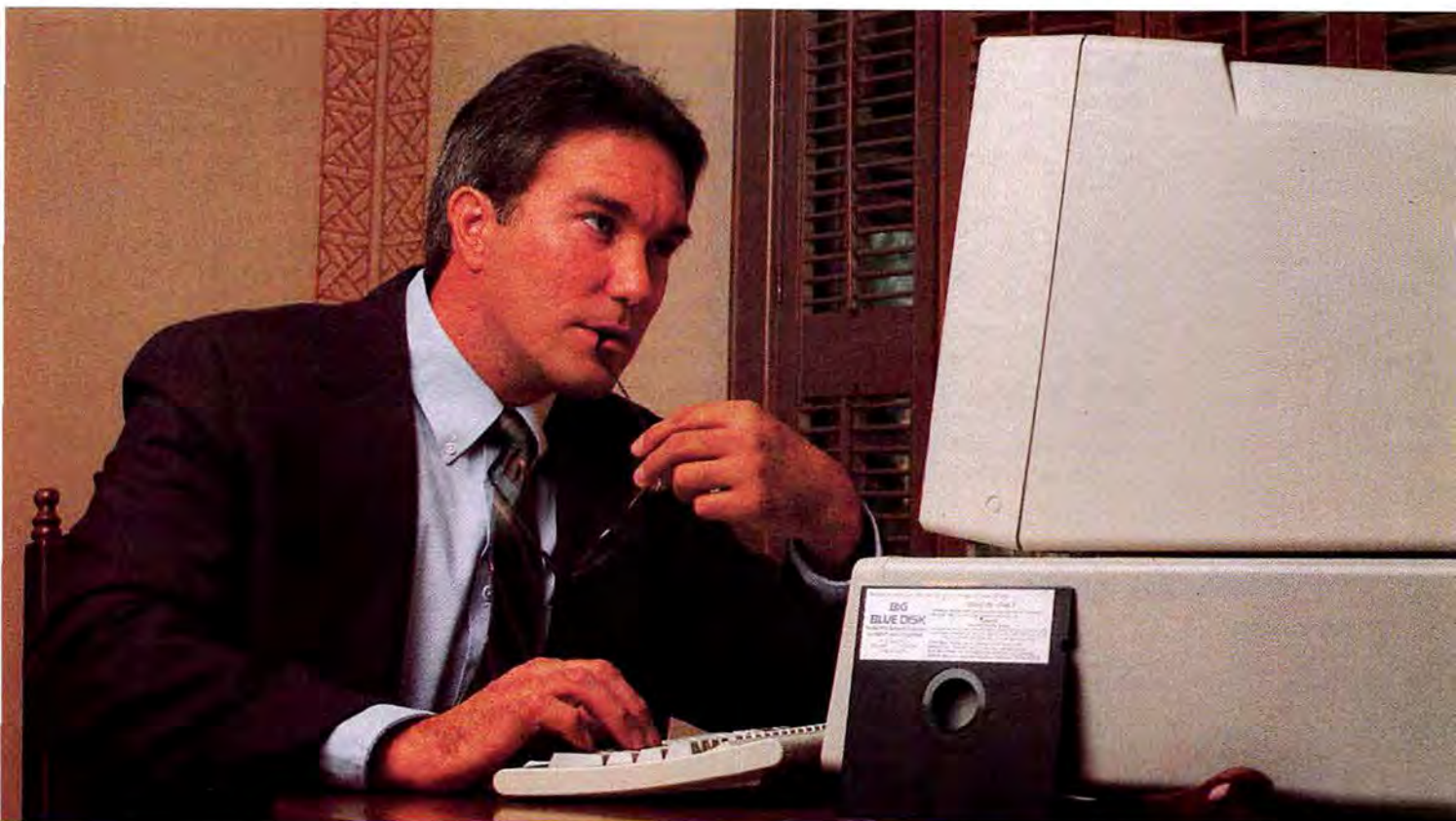
DeskMate Gains First Publisher

*Software
Publishing
Introduces
First Business
Best-Seller for
Tandy's
Interface*

Software Publishing's *First Publisher 2.0* has become the first major business product to ship under Tandy Corporation's *DeskMate*, approximately eight months after Tandy announced plans to license the user interface/desktop utility. *First Publisher* product manager Jill Groginsky attributes the long lead time to the difficulty of creating a memory management scheme so that both the character-based graphic user shell and the 430K application can fit within 640K. Symantec also has signed on to the specification but doesn't expect to deliver before June. Except for the addition of VGA color support, *DeskMate* compatibility is the principal enhancement in this version of *First Pub-*

lisher, which has sold an estimated 200,000 copies since its 1987 introduction. Groginsky says the development will be worth the trouble if it lets the Mountain View, California, company reach the estimated 300,000 Tandy computer customers who use *DeskMate* regularly (out of 1 million who own it). The program also is showcased in Tandy's 1 million product catalogs and on the shelves of its 600 Computer and Computer Plus stores, and can be ordered through the remaining 6400 or so Radio Shacks. Groginsky expects the first order from Tandy to cover development costs. If *First Publisher* is successful under *DeskMate*, other products such as *Professional Write* could follow.

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MicroPro Refocuses

Pioneer Reorganizes, Gains New President, and Re-thinks Product Line

After three years of sluggish sales for its flagship, *WordStar*, and the largest operating loss in its history, MicroPro International has replaced President Leon Williams with Chief Operating Officer Gari Grimm, downsized the company, and redirected its marketing activities. Partly due to delay in releasing *WordStar 5.0*, MicroPro lost \$5.1 million on virtually flat revenues of \$42.3 million in fiscal 1988 and lost \$2.6 million on revenues of \$9.7 million in the first quarter ended November 30. In an effort to cut \$3 million in operating costs, Marc Bailey, executive vice president of sales and marketing, combined existing departments and cut staff by about one-fifth. But he more than doubled the number of direct salespeople to 30 and

launched channel promotions that gained the company 650 new dealers during the last quarter of 1988. (Only 15 percent of dealers had been selling *WordStar*.) Bailey has refocused marketing to emphasize what he calls "the genius of *WordStar*"—touch typists don't have to move their fingers off the "home keys" in order to navigate a file or use the most common editing functions. Rather than compete with *WordPerfect* and *Microsoft Word* on number of features, MicroPro will emphasize that *WordStar* offers users the most popular feature set running efficiently on the smallest platform. More than 3 million copies of *WordStar* have been sold, with 360,000 registered users. A mostly technical revision, *WordStar 5.5*, was released in February.

OS/2 Enhancements Coming

IBM, Microsoft Draw Blueprint for Operating System

A rebuilt file system, an 80386 version, and a move into object-oriented programming are among OS/2 plans outlined recently by IBM and Microsoft executives. Although a release date has not been specified, the upgraded file system will offer faster access, greater usability (including longer file names and the ability to attach other attributes such as author name and revision date), and standardized hooks to a broader range of media (such as CD ROM). A tool kit is expected around mid-year for the 80386 version, which will run existing OS/2 packages but will also add 32-bit linear addressing and the ability to run multiple DOS sessions. While OS/2 1.1's Presentation Manager provides a foundation for object-oriented programming, the system software eventually will be

extended to accommodate more complete object-oriented attributes à la Hewlett-Packard's *New-Wave* environment. Developers will be able to create libraries of reusable objects that combine data and code—boxes, scroll bars, or even applications such as data bases—and can be easily linked together or moved across different hardware platforms. Currently, OS/2 has attracted 200 developers, plus 55 system manufacturers, most of which expect to begin shipping their versions of OS/2 1.1 this month. OS/2 acceptance has been slowed by a dearth of applications, the need for hardware suppliers to create printer and screen drivers, and revelations that typical memory requirements will start at around 4MB, comments Compaq vice president of sales and marketing Mike Swavely.

SPI Ships Miris

Integrated Software Developer Prefers Ease of Use to dBASE Standard

Software Products International (SPI), maker of the *Open Access II* integrated package, has unveiled a relational data base development system that lets even novice users customize the reports of executable run-time applications. *Miris* ships as a \$795 developers' edition that produces economical code, claims Ron Stevenson, director of product applications. The software also includes a compiler and an unlimited run-time license so that commercial and in-house developers can distribute applications to users who lack a copy of the development system. A \$395 user tool kit, *Stations*, allows

users to customize *Miris* report formats or develop new reports simply by painting them on the screen. *Miris* also includes a word processor, a spreadsheet, and telecommunications and graphics modules. These, Stevenson says, are more capable than similar modules in *Open Access II*. The San Diego firm has sold about 100,000 copies of this high-end integrated package, most of them overseas. *Miris* will be marketed to corporate and commercial developers in the United States, although it will not read native *dBASE* files, and other applications can't read its SQL. ●



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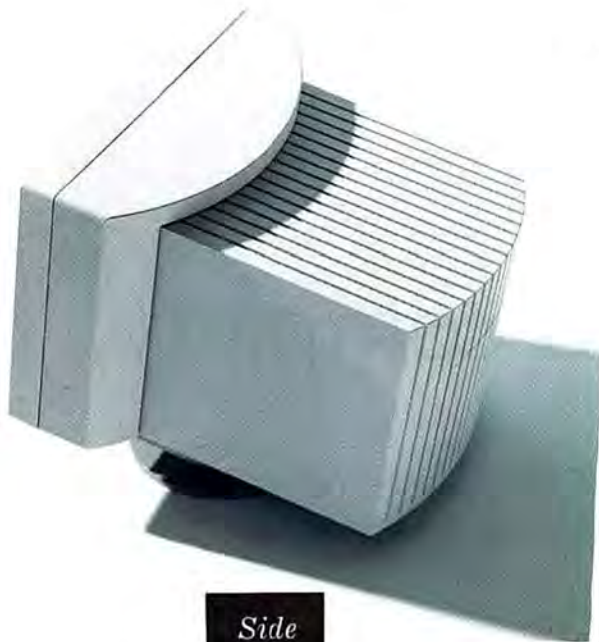
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data base software is showing up in some strange places.



Richard Landry

When you think data base software, you think *dBASE*—right? Think again. One of the most interesting software packages of 1989 is a data base, but it doesn't advertise itself as such. In fact, it doesn't even claim to be a full-blown application. Instead, Borland's *SideKick for Presentation Manager* is a great example of how data base concepts will add zip to the next generation's software (see Eric Knorr and Karl Koessel's *Preview* in this issue).

Borland built *SideKick for PM* around the novel idea that the user, not the application, owns the information he or she creates. In other words, you should be able to use *SideKick* Phonebook entries in a direct mail campaign that you run with Borland's full-blown data base, *Paradox*, or analyze costs in *Paradox* with data pulled from a *SideKick* schedule. That's not exactly a radical idea, but it's rare enough in practice. *SideKick for PM* turns this notion into reality by managing data with a *Paradox* kernel and saving it in *Paradox* file format. The item that you store in *SideKick* today will be available to you in *Paradox* tomorrow—and vice versa.

Although Borland's leading the pack into a "data-based" future, others are not far behind. Take a look at Microsoft's *Word*

5.0, Lotus's *Magellan* (see Eric Bender's *Preview* in this issue), Traveling Software's *ViewLink*, and Oracle's recently announced E-mail package, *Oracle*Mail*. Each of them treats the information on your hard disk as data that should be available to you quickly and easily. All of them have a data base manager growling beneath the hood. And that's just the start. Virtually every application you now use will soon have a data base manager at its core.

How far can this concept go? Ask *dBASE* creator Wayne Ratliff. With his *Emerald Bay* project, Ratliff envisioned a family of applications that snapped on to the same underlying data base core and shared information with it. Ashton-Tate has its own version of that idea, promising a future suite of *Presentation Manager* applications with hooks into its data base server. Somewhat sooner than that, Lotus will embed SQL data base hooks into 1-2-3 release 3.0 and its upcoming graphic spreadsheet, 1-2-3/G.

Such innovation brings its own troubles, of course. Vendors will be sorely tempted to create data-based solutions that work well only within their own product line. In this way they'll try to enforce customer loyalty to their
(continues)

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brand name and squeeze out the competition. Fortunately, that strategy has never been too successful—how many 1-2-3 users also use *Manuscript*? How many *WordPerfect* users also use *Plan-Perfect*? And admirable as *Side-Kick for PM* is, how many of its users will also use *Paradox*?

More important, data-based application software will raise a host of management issues you might never have considered before. Your choice of word processor, spreadsheet, or communications package, for example, will depend partly on how well the product fits into your company's data base scheme. And it will give new urgency to a question that gets more troubling each passing day: If I dump this software, can I take my data with me?

As always, I'm interested in your opinions on this or any other subject. Write to me at *PC World*, 501 Second St., San Francisco, CA 94107; fax 415/442-1891; MCI Mail Richard Landry/301-3685. ●

POWER TIP NO. 37

Scroll by Screen With WordPerfect

Since a *WordPerfect* page contains up to 54 lines of text, pressing <Page Down> or <Page Up> to search through a document will sometimes cause you to skip a full screen of text. Instead, use <Gray Plus> and <Gray Minus> to move 24 lines at a time.

Bruno Terkaly
Corte Madera, California

To learn Microsoft QuickBASIC, you only need a manual this thick.



You're looking at something you won't see anywhere else.

It's called QB Advisor. A remarkable new hypertext electronic manual that can make you instantly more productive, even if you don't know the first thing about programming. QB Advisor actually lets you experiment by cutting and pasting useful sample programs right into your programming window. Only Microsoft has it. Only Microsoft could. And it's just one of the things you'll learn about new Microsoft® QuickBASIC version 4.5 for IBM® PCs and compatibles.

Another is the step-by-step tutorial that actually takes you through every stage of programming by working you through a complete program.

And QB Express—the interactive way to learn all about your programming environment in a matter of minutes—not hours.

Microsoft QuickBASIC also comes with Easy Menus that let you develop programs with

a minimum number of menu choices. Context-sensitive Help for immediate help with error messages and variables by simply punching a key, or clicking a mouse. And a built-in debugger that lets you see exactly what your program is doing, as it's doing it.

Best of all, Microsoft QuickBASIC is packed with enough power to handle whatever problems drove you to programming in the first place. Fact is, it translates your program into executable code at an incredible 150,000 lines per minute.

Microsoft QuickBASIC version 4.5. If programming is the only way out, this is the easiest way in.



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If you're the type of person who's too busy to read an ad, read this ad.

Because you'll learn about a new tool that will help you manage people, ideas,



Dump any random, unrelated thoughts or ideas into Agenda, and it'll help you turn that information into a stream of structured, actionable knowledge.

projects, and information with incredible efficiency. A tool that will help you avoid slumping into your chair, shaking your head, and asking, "How on earth will I ever get this done?"

We call it Lotus® Agenda®, the personal information manager.

Agenda allows you to dump random facts, thoughts, and ideas into your PC without having to structure the information in advance.

Agenda's filing system is a more sophisticated version of this filing system. You can put items anywhere you want. View them any way you want. And have access to them anytime you want.

You can record the thousands of tasks you need to address to put together a new product

line. Or the thousands of factors you need to put together a new bottom line.

Agenda will not only file these random items of information for you, it'll help you arrange them any way you want.

So you can understand them better, formulate new ideas better and extract all the answers you need better.

Which means, now you can concentrate

File	View	Item	Category	Print	Utility	System	Quit	
New, Remove, Position, Assign, Discard, Undiscard								
Scratchpad				Who				Issues
• Forward product comparison articles to Joan.				• Joan				• Competitive Tracking
• Can we get the cost of goods sold under \$12?				• Tom				• Materials
• Bob will present ten-point incentives program at sales conference.				• Bob				• Bonus Dollars
• Tom will have his report in by a week from Friday; make sure it covers pricing, strategy, distribution, and implications of using outside vendor for typesetting and printing.				• Tom				• Distribution Vendors Pricing
• Decision needed on research budget by end of this week—discuss options with Jim and Joan.				• Jim Joan				• Research

Items. Dump information in manually, import it or use our pop-up capability while in another program.



everyone who's any work done.

Issues	Product Ideas	Who	Department
• Packaging	• Accept packaging bids until the end of October.	• Liz	• Operations
• Materials	• Make sure synthetic materials are reliable.	• Sue	• Operations
• Research	• Have Tom break down market research results into best case/worst case scenarios.	• Tom	• Marketing
• Distribution Vendors Pricing	• Tom will have his report in by a week from Friday; make sure it covers pricing, strategy, distribution, and implications of using outside vendor for typesetting and printing.	• Tom	• Marketing
• Distribution	• Do Tom and Bob think we need to adjust distribution mix?	• Tom • Bob	• Marketing • Sales

Categories. Agenda files items in all relevant categories so you can always find the information you need.

Issues	Joan	High	06/25/88
• Research	• Decision needed on research budget by end of this week— discuss options with Jim and Joan.	• High	• 06/25/88
• Competitive Tracking	• Forward product comparison articles to Joan.	• Low	• 07/07/88
Issues	Joan	High	06/22/88
• Distribution	• Do Tom and Bob think we need to adjust distribution mix?	• High	• 06/22/88
• Bonus Dollars	• Bob will present ten-point incentives program at sales conference.	• Medium	• 06/29/88

Views. Looking at the same information through different views gives you a more informed perspective.

different ways so you can pinpoint information that's important to you. Or discover new relationships you hadn't considered before. And anytime you change an item in a view, Agenda will

more on using and acting on your information. And less on processing it.

How does Agenda work?

First, enter your items of information



The whole idea behind Agenda is to get them all in a row.

into your PC and assign them to categories that you create.

Then Agenda will do all of your filing automatically. And thanks to Agenda's *multiple filing capabilities*, if the information is relevant in more than one place, Agenda will take it and put it in several categories at once.

This makes it easy to view your data in

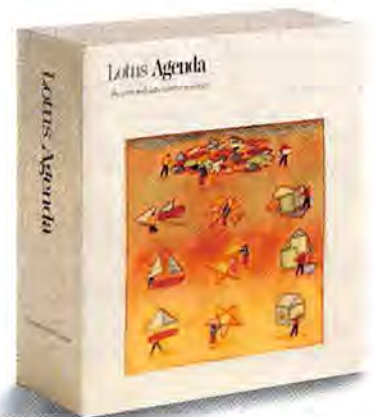
automatically update all other categories where the item has been assigned.

In fact, you could say that Agenda recalculates your text the way a spreadsheet program recalculates numbers.

All of which means, from now on you'll be able to come in every morning, check your Agenda, and get right to work.

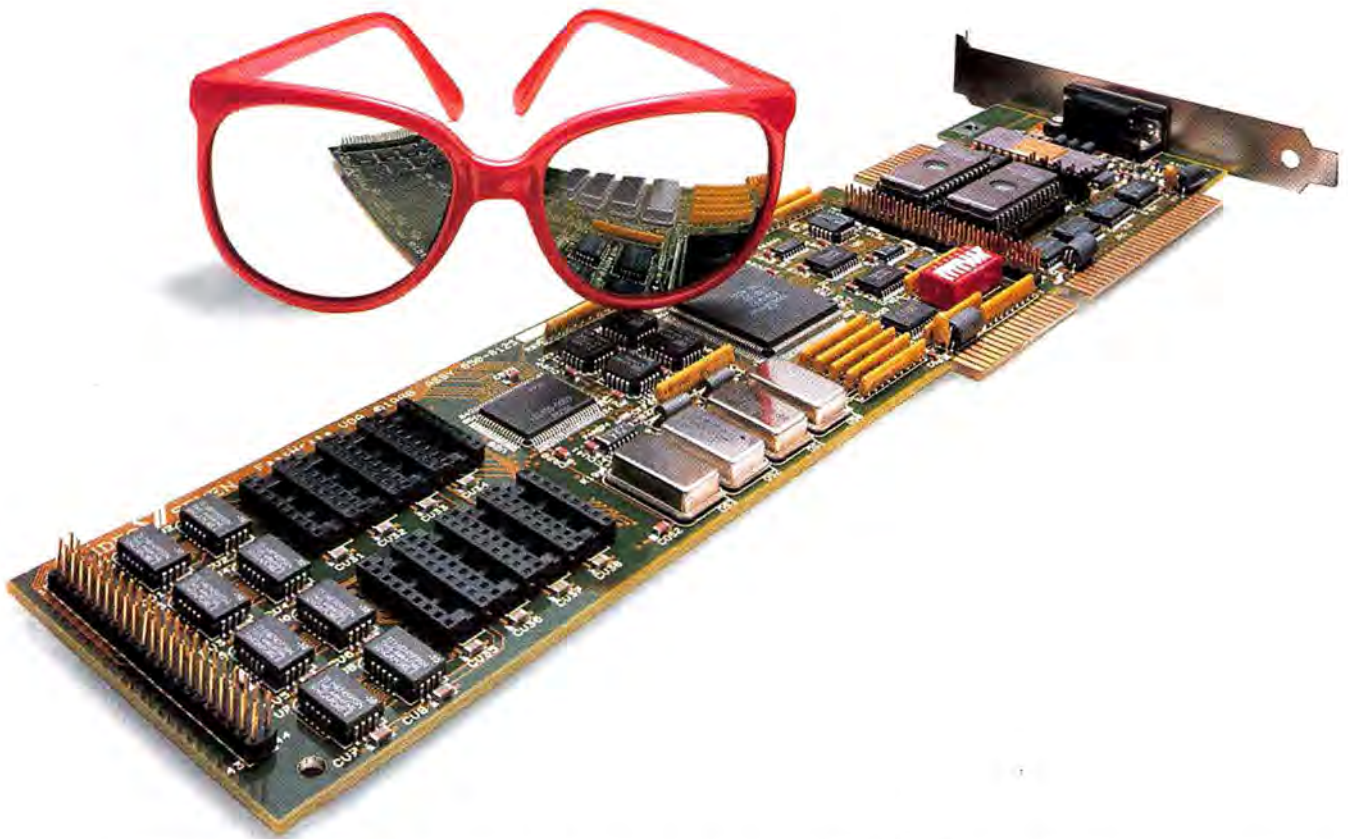
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Circle 277 on reader service card



LETTERS

Reactions and responses from the PC World community

Big Blue Is a Big Mistake

I couldn't agree more with Richard Landry on IBM's arrogant attitude ["EISA: IBM's Canary in a Cage," *PCW*, November 1988]. The little guys have caught up with IBM, and they have the engineers and R&D budgets to create better machines. These companies aren't under the "profit pressure" that IBM is; it's obvious that Big Blue is still looking for the big bucks.

I'll have to make purchase decisions on a few hundred PCs in the next three to five years. Rather than be caught in the box canyon of IBM's closed-ended architecture, I'll join the EISA group in thumbing its collective nose at IBM.

*Richard Harlin
Elmira, New York*

Let My Programs Go

I liked Richard Landry's column on EISA, in particular his remark that OS/2 promises to run on many different systems. Should that become a reality, the major squeeze we business software users are currently feeling could disappear. It seems as if every new program version has an .EXE file 10 to 20 percent larger than its predecessor's, reducing the work space available for data by the same amount. A new architecture that would free

us from our 640K cage but still let us run the 1-2-3s, *Frame-works*, and *dBASEs* we're accustomed to would be a dream come true.

*Joseph H. Nestor
Greenville, New Hampshire*

Why Not a PS/2?

The debate over the Micro Channel continues among the technical cognoscenti, but the average user will be swayed by the fact that MCA-equipped PS/2s are twice as reliable as other PCs and cost half as much to maintain. That means that over the long run a PS/2 may well be cheaper than a name-brand clone. And that 10 percent edge in performance the speed demons provide won't look so good when your computer's in the shop.

PS/2s are 100 percent software compatible. And, as your December 1988 Buyers' Guide ["Everything You Need to Upgrade Your PS/2"] shows, hundreds of boards, adapters, and drives are available for Micro Channel machines. So why not buy a PS/2?

*Peter H. Strong
Los Angeles, California
(continues)*

Openness Is the Key

In "Keys to IBM's Future Success" [*PCW*, November 1988], Will Zachmann is right in saying that users don't want to be led back into the proprietary world. IBM should spend much less time building fences and more time building open systems with better technology.

I think IBM listens too much to Microsoft and too little to its clients.

George T. Thibault
Parsippany, New Jersey

Fair Play for Sprint

I'm somewhat displeased with your review of Borland's great new word processor, *Sprint* [*The Software Shelf*, *PCW*, November 1988]. After slogging through six or seven of the "popular" programs, including *WordPerfect*, *Microsoft Word*, *PFS: Professional Write*, and *Q&A Write*, I had concluded that a good, flexible word processor just wasn't possible. Enter *Sprint*. With its changeable key assignments and choice of interfaces, it is completely customizable.

As for "clunky formatting," phooley! With *Sprint*, you decide what you want and where you want it. Any system seems clunky if you aren't used to it. Take the time to learn *Sprint* before you run back to the old dinosaurs. I could give you a run-down of what's wrong with each of them—from *WordPerfect's* demonic mnemonics and contortionist keystroke combinations to *Word's* three-legged racehorse of

an interface—but I'll spare you.

Still, I appreciate the quality of information *PC World* provides, even if some of your reviews are whacked-out.

Gary Litwiller
Germantown, Maryland

Batch Capability Is Essential

Michael Goodwin's "Multitasking Without OS/2" [*PCW*, November 1988] was a constructive discussion of multitasking with the Intel 80386. There was no description, however, of the tools available within these environments for controlling and customizing the user interface—in other words, an equivalent of the DOS batch programming language. An example of such a tool is Softbridge Microsystems' Bridge/386 language for *Windows/386*.

Another significant issue for corporate users is the transition to OS/2 and Presentation Manager. Of the four operating environments reviewed, it appears that only *Windows/386* will enable users to truly multitask and integrate existing DOS applications with programs (like *Excel*) that will be available under both *Windows* and Presentation Manager. I hope Mr. Goodwin will further enlighten us on these important issues in a future review.

C. Lawrence Meador
Cambridge, Massachusetts

Forget the "Please," Please

I couldn't agree more with Joan Hope's comments in *Another Angle* ["Plain English, Please,"

PCW, November 1988]. How many more people would buy computers if the machines were accompanied by understandable documentation?

James W. Bassett
Eagan, Minnesota

He Doth Believe in Hope

I have only one word to add to Joan Hope's "Plain English, Please": Amen!

Donald Balbo
Las Vegas, Nevada

Down With Tech

Cheers to Joan Hope for her suggestion that "computer vendors find a different kind of writer to prepare their instruction manuals." Like Ms. Hope, I agree that we need information written by people who understand the common user's problems and who can document them in plain English. I have yet to find a plain English manual or magazine geared toward someone like me—an average PC user.

Gilda Brock
San Francisco, California

Slow Down, Then Boot Up

Joan Hope's complaint is typical of people who don't expect to invest some time learning how to use their PCs. My advice: Treat learning about the PC as you would any new, complex skill. No one would expect to be able to
(continues)

Power without pain.



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Paradox, for the looks of things

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“Query-by-Example” for example

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If your database experience so far is limited to the flat-file type rather than relational, or even if a

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B O R L A N D

Circle 87 on reader service card

play the piano or speak French in a few days. If you want to add significant new skills to your repertoire, it's going to take a little work.

I was happy to see that the author said she would "invariably end up calling friends for help." They are the best source of correct, concise answers—and they don't put you on hold.

Terry Rich

Dickinson, North Dakota

Modem Test Mode Is Malapropos

The Zoom HC 2400 modem review in your November 1988 *Hardware Shelf* included NSTL testing, which, on the face of it,

seems like a good idea. But most readers will use this modem primarily in originate mode, and your tests were conducted in answer mode, making the test results useless.

Henry Gardiner

Plano, Texas

You're right. Although the Zoom HC 2400 evaluation used both originate- and answer-mode testing, a table showing originate mode results would certainly have been more useful to most readers. Future modem evaluations will include originate-mode test results. We regret the error. —Ed.

Arnold Harris for President

I would like to thank you for running Mark Marek's "Two-Fisted Management" in your pages. Although I am sure that its creator didn't intend the strip to be taken seriously, it is refreshing to see a character like Arnold Harris who is totally devoted to the most maligned, hated, feared, and *moral* economic system known to man: capitalism.

Mark A. Penman

Cleveland, Ohio

A Clarification From NEC

I was pleased to see your timely coverage of NEC's three new
(continues)

Q.

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A.

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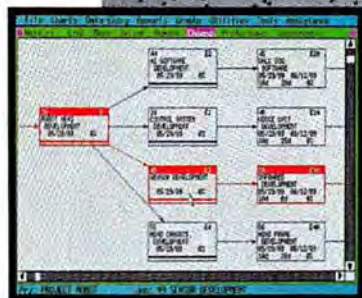
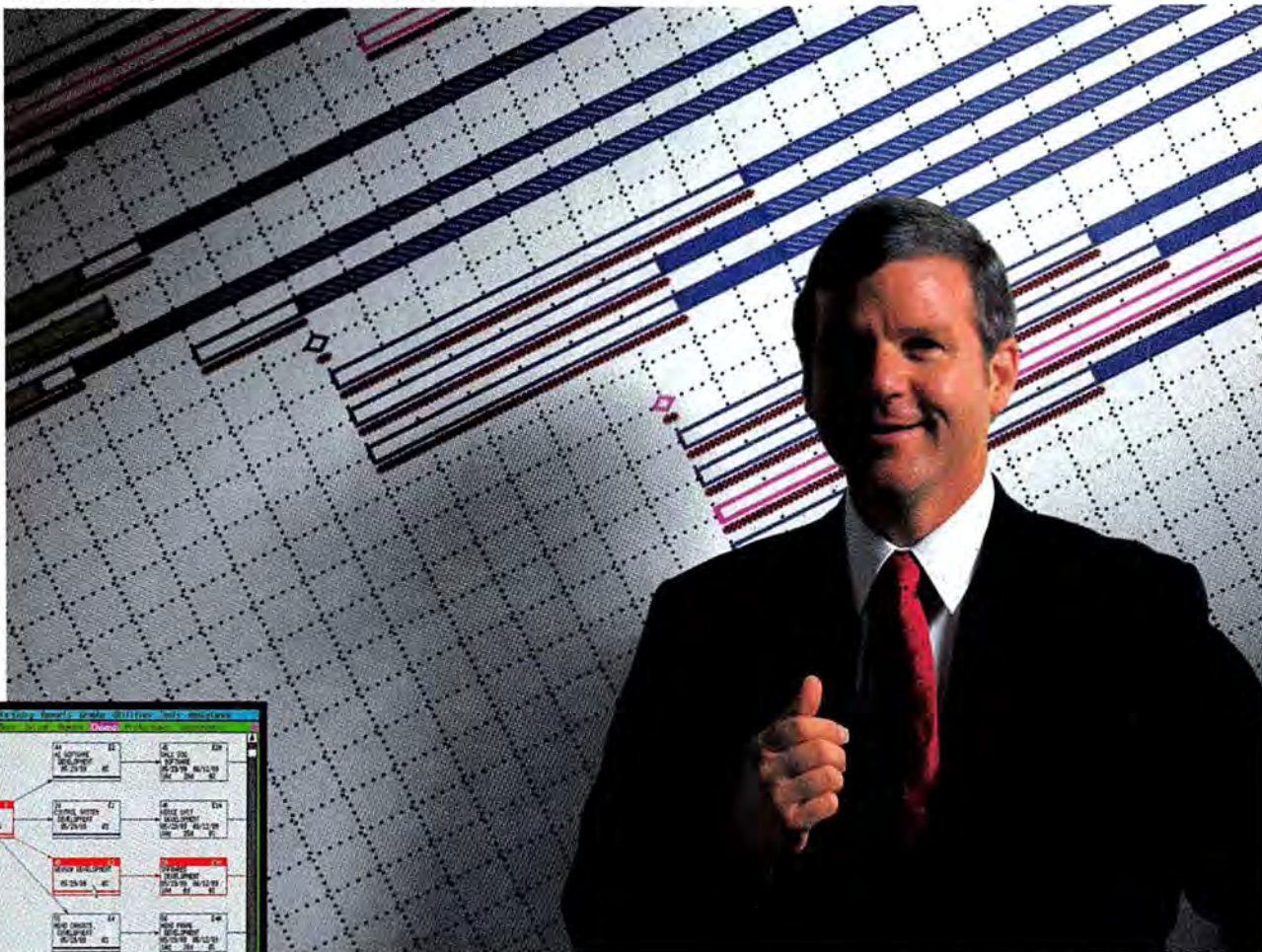
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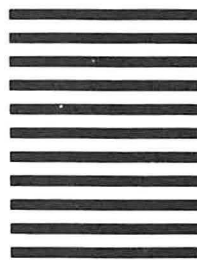
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ble modem (or optional 2400 BPS modem). Transfer your data files and access Telex, E-Mail, Dow Jones, or other public databases.

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LETTERS

laptop products in the November 1988 issue of *PC World* [Preview, "Laptops of Luxury"]. However, I would like to clarify for your readers a few of the key differences between the NEC ProSpeed 386 and its sibling, the NEC ProSpeed 286.

The preview implied that other than their dissimilar processors, the two machines were essentially identical. In fact, the ProSpeed 286's different overall design renders it 4 pounds lighter and 20 percent smaller than the ProSpeed 386. And unlike the 386 machine, the ProSpeed 286 offers black-and-white VGA graphics and is designed primarily for battery-powered operation. In addition, the cable-connected Expansion Station for the ProSpeed 286 provides extensive rather than "garden-variety" features, including slots for four standard 16-bit boards and space for one half-height drive.

Thanks for allowing me to clarify these important points and for your continued excellent coverage of the fast-paced laptop computer market.

James D. Bartlett

Manager, Strategic Marketing

NEC Home Electronics

(U.S.A.) Inc.

Wood Dale, Illinois

Corrections

The phone number listed for Zenith Data Systems in two December 1988 *PCW* articles, "Laptops With Storage to Spare" and "VGA Monitors—Cheap and Smart," is incorrect. For more (continues)

PC WORLD ANNOUNCES
THE 1989 WORLD CLASS AWARDS

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products

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Inside

HOW TO ENTER

Voting for PC WORLD's 1989 World Class Awards is easy. Simply write the names of your top-rated products on the ballot on the opposite page and return it to PC WORLD. The product receiving the most votes in each category will be designated a World Class winner. We will announce the award winners (and runners-up) in the October 1989 issue of PC WORLD.

HOW TO WIN

When you mail your ballot, you'll be doing more than simply voicing an opinion—you'll also make yourself instantly eligible for a host of prizes worth over \$50,000!

First prize will consist of what we call the Super PC System: the highest-rated desktop computer plus the winning hardware and software products in over 30 categories!

Second prize will be the most popular transportable computer, and the third-prize winner will receive the heaviest hitter in a lightweight category—the winning laptop computer.

Don't delay; remember, PC WORLD is also giving away special prizes to the first 100 readers who send in their ballots. So let your voice be heard throughout the PC industry. Cast your ballot for PC WORLD'S 1989 World Class Awards today!

C A T E G O R Y D E S C R I P T I O N S

To help you cast your votes, we've supplied background information on those product categories that may not be self-explanatory.

- ▶ **Dot Matrix/NLQ Printer**
Dot matrix printers that provide a draft-quality print mode or combine dot matrix and near letter quality (NLQ) print modes.
- ▶ **Monitor**
VGA, EGA, color, monochrome, or "paper white" displays.
- ▶ **Memory Expansion Board**
Boards that supply additional conventional or expanded (EMS) system memory. Boards in this category may also include a clock/calendar and parallel or serial ports.
- ▶ **Graphics Board**
Boards that offer VGA, EGA, CGA, or Hercules-compatible graphics. Please specify whether your chosen board is monochrome or color.
- ▶ **Mass Storage**
All forms of mass storage, such as hard disk drives, removable high-capacity drives, optical disk drives (WORM and CD ROM), and tape backup units.
- ▶ **Input Device**
Scanners, mice, keyboards, digitizing tablets, light pens, and so on.
- ▶ **Local Area Network—Network Board**
First-place winner in the two local area network (LAN) categories are the only products that will not be given away. But we'd still like to know which LAN you think merits the most attention. In this hardware category, we're looking for the names of expansion boards that link PCs in a LAN (not the name of the network's file server).
- ▶ **Word Processing Utility**
Outline processors, spelling checkers, grammar and style checkers, thesauruses, and more.
- ▶ **Desktop Publishing**
Programs used for page layout, font creation, editing, integration of text and graphics, and typesetting that support page formatting and laser printer fonts.
- ▶ **Desktop Publishing Utility**
Drawing and painting programs, image capture and manipulation programs, clip-art collections, font generators, special printing utilities, downloadable font libraries, and more.
- ▶ **Spreadsheet Utility**
Programs that add features or enhance existing spreadsheet functions such as add-in word processors and data base managers, file-compression programs, macro managers, and special printing utilities. Also, templates designed for specific spreadsheet tasks such as tax preparation and financial analysis.
- ▶ **Relational Data Base**
Powerful relational data management programs that feature large record capacities, sophisticated query systems, full-blown report writers, text import and export capabilities, and command languages.
- ▶ **Flat-File Data Base**
Flat-file data management programs that operate on only one file at a time and are often used to maintain mailing lists, contact lists, and the like.
- ▶ **Utility**
Programs that perform functions not typically provided by the operating system, such as file recovery, management, or conversion; macro and keyboard enhancement; disk emulation; and printer support.
- ▶ **Communications**
General and remote communications programs, packages dedicated to gathering electronic mail, and micro-to-mainframe communications packages designed for terminal emulation and data conversion.
- ▶ **Desktop Organizer**
Products that replace such deskbound aids as a Rolodex, notepad, adding machine, appointment scheduler, phone directory, and others.
- ▶ **Integrated**
Programs that incorporate several applications—usually word processing, spreadsheet, graphics, and data management—and share an interface, a command structure, and data. The applications may be tightly integrated or in separate modules.
- ▶ **Operating Environment**
An operating system or extension, often called a windowing environment, that allows you to run a number of off-the-shelf applications at once and easily share data among them.
- ▶ **Business Graphics**
Programs that produce several types of charts and are used for business presentations.
- ▶ **Computer-Aided Design**
Programs used for drafting and modeling by designers, engineers, and architects.
- ▶ **Personal Finance**
Programs that monitor personal finances, keep household records, or organize personal data. Also includes personal investment programs that perform portfolio management, technical analysis, fundamental analysis, and stock information retrieval.
- ▶ **Local Area Network—Network Operating System**
This product (along with the first-place LAN network board) will not be awarded, but we'd like to know which network operating system you think is the best.
- ▶ **Most Promising Newcomer**
Vote for the recent software and hardware arrivals you feel have had the greatest impact. *Recent*, in this case, means the product was released after September 1, 1988. You may vote for a product you've already cited in another category.

GUARANTEED PRIZES
to the first 100 readers
who send in their ballots

1989 WORLD CLASS AWARD BALLOT ENTRY FORM

Dear Reader: Please use this entry form to vote for products you are familiar with and would recommend, based on their performance and value. Choose one product per category; you don't have to vote in all categories. Eligible products must be IBM PC compatible and commercially available as of March 1, 1988. **Note: To ensure accuracy, a vote will not be counted unless the following three items are provided: (1) manufacturer's name, (2) name of product, and (3) model number for hardware, version number—if applicable—for software.** Please print or type your entry and submit it by April 15, 1989.

Name _____
 Company _____
 Address _____ State _____
 City _____ Daytime phone _____
 Zip _____



	Manufacturer	Name of Product	Model Number	
<i>Sample Entry</i>	XYZ COMPANY	PERFECT PC 286	16	
Desktop Computer (first prize)				1
Transportable Computer (second prize)				2
Laptop Computer (third prize)				3
Dot Matrix/NLO Printer				4
Laser Printer				5
Monitor				6
Modem				7
Memory Expansion Board				8
Graphics Board				9
Mass Storage				10
Input Device				11
Local Area Network—Network Board				12
Most Promising Newcomer—Hardware				13



	Manufacturer	Name of Product	
<i>Sample Entry</i>	XYZ COMPANY	TOP WORD (2.1)	
Word Processing			14
Word Processing Utility			15
Desktop Publishing			16
Desktop Publishing Utility			17
Spreadsheet			18
Spreadsheet Utility			19
Relational Data Base			20
Flat-File Data Base			21
Utility			22
Communications			23
Desktop Organizer			24
Programming Language			25
Integrated			26
Operating Environment			27
Game			28
Business Graphics			29
Computer-Aided Design			30
Accounting			31
Tax Planning or Preparation			32
Personal Finance			33
Local Area Network—Network Operating System			34
Most Promising Newcomer—Software			35

DETACH ENTRY FORM AND MAIL TODAY!

PC WORLD'S 1989 WORLD CLASS AWARD BALLOT

Vote for your favorite PC products

**GUARANTEED
PRIZES**

See
Inside

CONTEST RULES

Each person may enter the contest only once. Type or print your choices on the entry form on the opposite page. Employees of product manufacturers are eligible to vote for any products other than those sold by their company.

Your entry must include your name, address, and daytime telephone number. Entries must be postmarked no later than April 15, 1989. Employees of PCW Communications and their immediate family are not eligible. Please tape (do not staple) the form closed when mailing.

FOLD HERE AND MAIL TODAY! PLEASE TAPE. DO NOT STAPLE.

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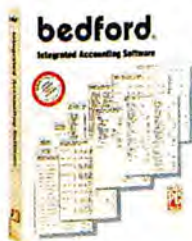
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PC EDITOR'S
MAGAZINE CHOICE
September 1987

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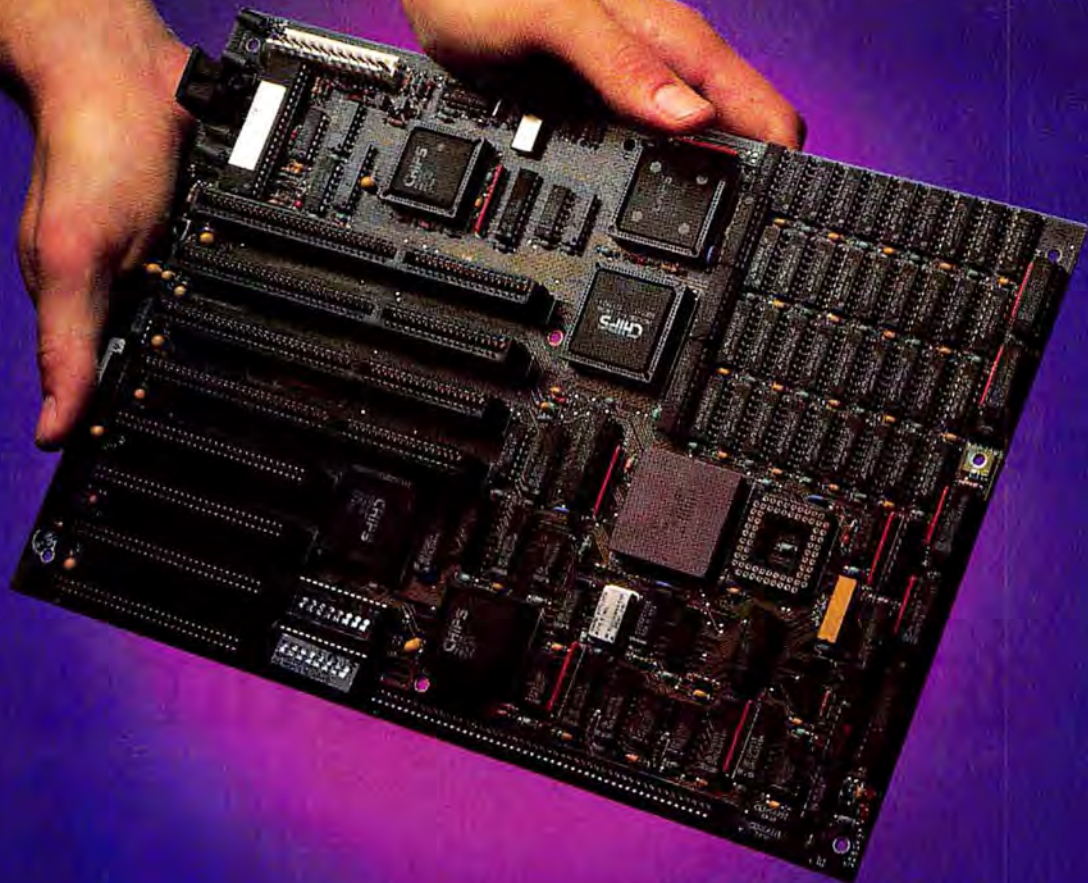
information on Zenith products,
call 800/842-9000.

December's VGA monitor re-
view also contained errors relat-
ing to the products themselves.
The list price of the Zenith
ZCM-1390 monitor is \$699, not
\$799 as reported, and the dot
pitch of the Zenith ZCM-1490 is
.28, not .31. And as of May 1988,
a tilt-and-swivel stand is includ-
ed as a standard feature of the
ZCM-1490. Contrary to the arti-
cle, the Magnavox Professional
VGA has both vertical-size and
vertical-hold controls and comes
with a two-year rather than a one-
year parts and labor warranty.
Had these facts been reported,
the Zenith and Magnavox moni-
tors would have received more
favorable evaluations.

In the same issue, "Buyers'
Guide: 20-MHz 386 Systems"
listed an incorrect address for
Fivestar Computers. The compa-
ny may be contacted at 1621 W.
Crosby #112, Carrollton, TX
75006; 214/242-7000. We regret
any inconvenience this has
caused our readers.

The same Buyers' Guide—as
well as the review "Surprise Val-
ues at 20 MHz," also in the De-
cember issue—gave an incorrect
address and phone number for
AT&T. The correct address is
8000 Baymeadow Way, Rm.
1-2-099, Jacksonville, FL 32256;
800/247-1212.

To send correspondence or to
submit material for publication
in this column, please see How
to Contact PC World, page 4. ●



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You're sitting at your PC on the 3rd floor working on a spreadsheet budget. Suddenly, a message appears on your screen: "Bob requests help". You press a hot key, and like magic you are looking at Bob's screen. Without moving an inch you see that Bob is working on the company database. A dialog window appears and Bob explains his problem. Since your keyboard is active you instantly solve the problem, on Bob's computer.

With another hot key you decide to look in on Sue's computer screen. She's new and you need to keep an eye on her work. You see that she is working on a letter using a word-processor. You monitor her for awhile without interfering with her work. In fact, Sue doesn't even know you're there!

Hot key again and off you go on your rounds of the company. Viewing one screen after another, helping some, watching others. All from the comfort of your chair. Finished, you hot key back to your spreadsheet and carry on with your budget. Amazed, you think that support has never been this easy before.

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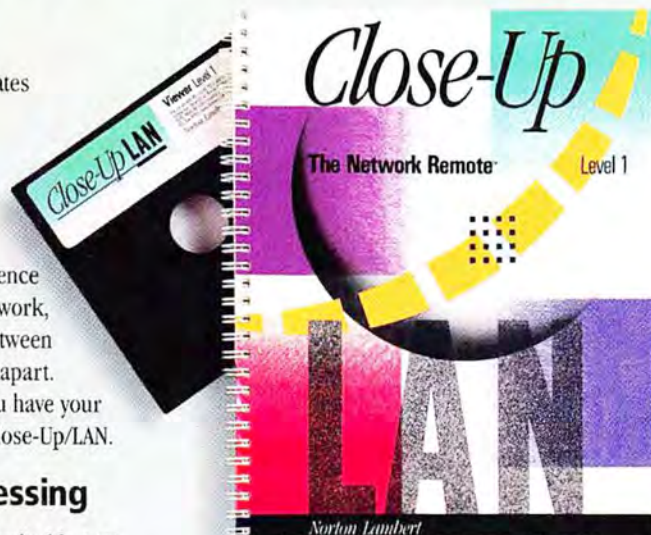
Close-Up/LAN distributes valuable LAN resources to all PCs on your network.

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Access is only a keystroke away. While working at your word processor, you decide to run a CPU intensive job on a 386 computer located somewhere on your network. Hot key to the 386 and control it as if it were your own. Close-Up/LAN connects your keyboard and screen to the 386. Start your CPU intensive job (like re-indexing a database). Then, hot key back to your wordprocessor. Toggle back, and you can view the 386.

Think of it. You can give everyone on your network the power of all peripherals at a fraction of the cost.



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To Sue, Perchance to Win

But we lose when software companies go to court.

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David
Bunnell

Remember Adam Osborne? He's the fellow who marketed a low-cost and notably improved version of *1-2-3* a few years ago through his Paperback Software Company. That good idea landed him a sizable lawsuit from Lotus, charging that his program violated *1-2-3*'s "look and feel."

The Lotus suit, which created an uproar, was filed over two years ago. I ran into Adam recently, and guess what? He was busily preparing for the second round of depositions in his case. The trial date had not been set, and the lawyers were busily working away on the reams of documents needed for the legal labyrinth that lies ahead.

Since the suit was filed, Paperback has had a tough row to hoe. It has lost market share, laid off employees, and virtually disappeared from the industry. Whatever the outcome, Lotus's effort to quash Paperback demonstrates that big companies can use legal tactics to protect themselves and hinder the little guys, and in the process slow down the pace of innovation in the market.

You have to wonder, then, about the motives behind the suit Ashton-Tate recently filed against *dBASE* clone makers Fox Software and the Santa Cruz Operation, which sells the

UNIX version of *Foxbase*. *Foxbase*, which is significantly faster and cheaper than the original *dBASE*, has been on the market for over two years. How come Ashton-Tate took so long to be bothered?

When asked this question recently, Ashton-Tate president Ed Esber reportedly said, "If you robbed us two years ago or if you robbed us yesterday, it's the same thing." True enough, but Ashton-Tate's delayed response would seem to weaken its case. Besides, doesn't it make you wonder if Ashton-Tate is just trying to warn up-and-coming enterprises to stay off its turf? Of course, the suit will send a chilly wind through the whole software industry, as well as lessen the pressure on Ashton-Tate to produce better data base products. PC users lose both ways.

It amazes me that Ashton-Tate doesn't see that *Foxbase* and other data base programs have helped to make the *dBASE* language the clear standard. They have put Ashton-Tate in the driver's seat because it is by far the biggest publisher of *dBASE*. All Ashton-Tate has to
(continues)

FINALLY!

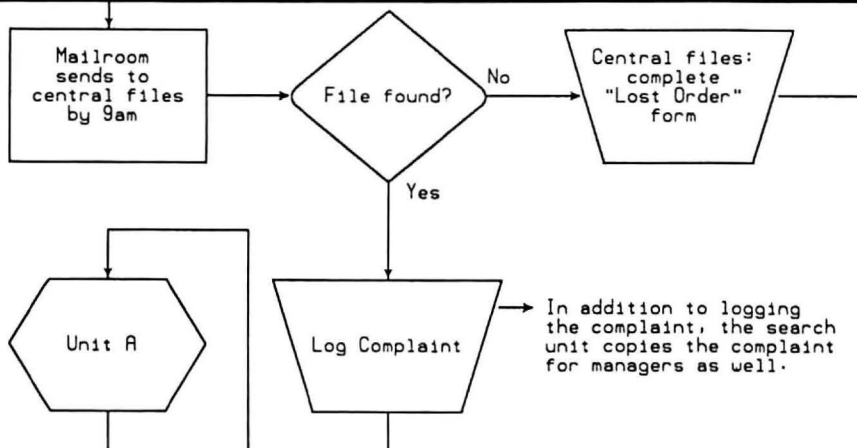
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A n on-screen flowchart processor that knows about flowcharts - not just another "screen draw" program that makes you do most of the work. *EASYFLOW* is a powerful full-screen graphics program dedicated to flowcharts and organization charts. With it you can quickly compose charts. More important, you can easily modify charts so they are always up to date.

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- ▶ **Mouse:** Optional but fully supported.
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The chart fragment above was produced on an HP LaserJet-Plus and is actual size and unretouched. Publication quality charts like this can be produced using only minutes of preparation time and seconds of print time.

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do to compete effectively is push the standard ahead with more innovative improvements.

IBM has learned this lesson the hard way over time. By trying to force would-be PS/2 clone makers to pay royalties, it has lost what was once a clear leadership position. Nowadays, in an effort to regain that position, Big Old Blue is practically begging manufacturers to make PS/2 clones.

Complicated, drawn-out lawsuits result in huge fees and encourage a proliferation of similar suits. Of course the only clear-cut winners in this sort of legal battle are the lawyers. If *Fox-base* sales dry up as a result of Ashton-Tate's suit, we are encouraging more legal battles. What can users do about this? For one thing, by continuing to buy quality clones (both software and hardware), we can refuse to be intimidated by lawsuits. The thousands of people who belong to *dBASE* user groups could pressure Ashton-Tate to drop its suit and put more resources into product innovation. They might even create legal defense funds to help Fox Software.

It's my hope that if enough people see that their own best interests are threatened by Ashton-Tate's lawsuit and respond accordingly, Ashton-Tate will feel the chilling effect back in its own corridors. Ultimately we have to decide whether our broad needs as PC users are more important than the narrower interests of self-serving companies that want our business. I don't think there's any contest. ●

HP LaserJet Series II



- Fully compatible with Acer LP-76 resident and soft fonts.

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- 21 Acer equivalent font cartridges
- A wide range of software compatibility, including the most popular software packages.



- 512K of standard memory, with 1, 2 and 4MB expansion memory modules.

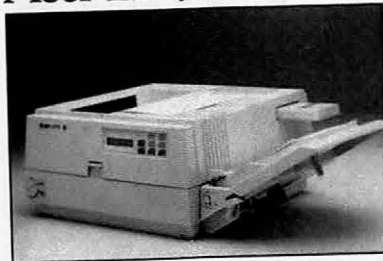
- 300 DPI graphics



- Face-up and face-down output capability



Acer LP-76



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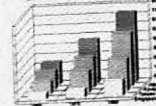
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- 21 HP equivalent font cartridges
- A wide range of software compatibility, including the most popular software packages.



- 512K of standard memory, with 1, 2 and 4MB expansion memory modules.

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- Face-up and face-down output capability



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Do you use the new, high capacity, 3½ inch disks? If so, you have paid four, five, even six dollars per disk! Byte for byte, that is as much as SIX TIMES the 'old' 360K floppies. Now you can convert all your programs, data, and files to the new format, WITHOUT PAYING THESE PRICES!

HOW IS THIS POSSIBLE? Have you ever tried to format a regular, 'low density' 3½ inch disk to 1.44 MB? Of course you have! It doesn't work! The computer gives an invalid media error. Our company was putting in a large network of IBM Clones. We have grown from a small company to a million-dollar corporation in two short years, and we didn't do it by wasting money. So, of course, we tried to use the cheap, 720K disks. Total failure.

ENTER OUR CRACKPOT ENGINEER. Our Crackpot Engineer wondered what was the difference between the disks. He tore them apart, analyzed the media. He found NO DIFFERENCE WHATSOEVER! Yet, they would not format. Why? Then he started examining the plastic housing. And he found the difference. It is NOT in the media, IT IS IN THE PLASTIC CASE!

TOTAL FAILURE! Our Crackpot Engineer (among other things, he invented the Electronic Flea Collar) sent a brand-new 720K disk to our machine shop, and asked them to modify it. They did... and the DISK IMMEDIATELY FORMATTED! But, within 10 minutes of use, it totally failed. It lost data all over the place. Back to the drawing board. The disk was dis-assembled and examined. It was found that, in performing the conversion, a microscopic piece of plastic had entered the housing, and totally ruined the disk. It was obvious that, if the conversion could be done reliably, it required extreme precision.

ENTER OUR OTHER CRACKPOT ENGINEER. Our president is a mechanical engineer. One of the best in the country. While a research scientist at Colorado School of Mines, he completely revolutionized the field of water jet drilling. He tackled the problem. Finally he came up with a solution - a precision tool which could perform the modification EVERY TIME and leave no plastic particles which would damage the disk!

MONTHS OF TESTING. We then commenced on a testing program. We modified and formatted thousands of disks, and tested them for data integrity. Out of one thousand disks, one would not format, two had one bad track. NOT ONE LOST ANY DATA! We then put a disk on a computer with a bat file which copied data to a disk, read and checked every byte, then copied the data back to the disk. The program ran 24 hours a day, for TWO SOLID WEEKS without even one error! We were finally convinced that the procedure was reliable enough for a product.

OUR OFFER. Here is our irresistible offer. Purchase our DoubleDisk Converter for the price of \$39.95. If you are not COMPLETELY SATISFIED, return the DoubleDisk. You will receive a FULL REFUND! What is more, if a disk ever does not convert properly, send us the disk, and we will send you a 1.44MB disk from a major manufacturer in exchange!

YOU CAN'T LOSE! You will save MORE THAN THE PURCHASE PRICE IN CONVERTING ONLY YOUR FIRST TEN DISKS! From that point on, it is all profit. After converting only 100 disks, and after deducting the cost of the DoubleDisk, you will have saved AT LEAST \$425.00! Quite a return for an investment of only \$39.95!

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PC WORLD

Next
in

PC WORLD

April

Languages Special Report

Our magazine-within-a-magazine series continues with this in-depth look at tools for programmers and developers. Whether you speak C, BASIC, or Pascal, you'll find a review or tip to make you a better programmer—plus a special feature on object-oriented programming.

Affordable 386s

The stratospheric performance of 16-MHz 80386-based computers now has a down-to-earth price tag. Best of all, these systems are poised to launch the next generation of OS/2 applications without forcing you to make any compromises. *PC World* reviews ten of the most popular units.

All the Software You'll Ever Need

Who says you can't have it all? Four inexpensive packages promise a seamless blend of word processing, data management, communications, and more. Integrated software isn't for everyone, but laptop toters and casual PC users may find it's just the ticket.

Aw...What the Heck!

EXTREMELY POWERFUL

DesignCAD 3-D version 2.0 is as powerful as most CAD systems costing \$5000 - \$10,000! Features like: Complex Extrusions-linear, scalar, and circular, Blending of Surfaces, Shading, Cross Sectioning, Complex Sweeps and Translations, and Boolean operations make DesignCAD 3-D one of the most powerful 3-D CAD systems available... at any price! Engineers, Architects and Consultants constantly tell us that they use CAD systems costing thousands of dollars which are not as powerful as DesignCAD 3-D.



VERY EASY TO USE

Just because DesignCAD 3-D is powerful doesn't mean it is difficult to use. Single keystroke commands and side-bar menus which give short directions on how to proceed make DesignCAD 3-D a snap to use! While not required, DesignCAD 3-D supports all popular digitizers and mice.

Many of the older, more cumbersome CAD systems require weeks of training before a user can be productive. DesignCAD 3-D users find they can be producing useful drawings in a matter of minutes! In a recent CAD contest only one contestant was able to match our drawing time. The package sold for \$3000.00. The other CAD packages took up to twice as long to perform the same drawing and cost up to \$5000.00!

Still don't believe us? The goblet pictured below required only 16 keystrokes and 3 commands to create! The top, front, side, and isometric views were created simultaneously... in less than one minute!

VERY LOW PRICED

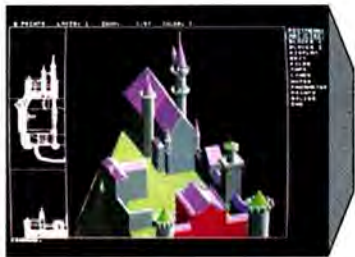
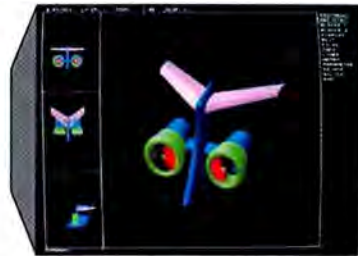
The first question asked by many people is, "Why is DesignCAD 3-D priced so low?" The answer? After developing DesignCAD 3-D version 2.0, we were unable to decide how the product should be priced. We consulted experts. We used the finest spreadsheets on the market. We took employee polls. Finally, in the great American Tradition, we said, "Aw... What the Heck! Let's see the other guys beat this price!" DesignCAD 3-D version 2.0 sells for \$399.



DesignCAD 3-D only \$399!

WHY BUY THIS ONE?

There is a very important reason to buy DesignCAD 3-D. PERFORMANCE. No other CAD system can match our price/performance ratio. Many people make the serious mistake of thinking that it is necessary to spend thousands of dollars to obtain "a good 3-D CAD system." This is not true! We talk to people everyday that are sadly disappointed with their "expensive" CAD systems. Don't be one of them! Call us and we will send you a complete set of literature and a free slide show demo disk. Once you compare DesignCAD 3-D version 2.0 with other CAD systems we know you will choose DesignCAD 3-D.



DON'T TAKE OUR WORD FOR IT

Here is what other people have to say about DesignCAD 3-D:

"After you've worked with DesignCAD, the single keystroke commands are simple to remember and it becomes easy to "flick one key" to execute a command. An extremely ergonomically designed program."

HENRY LEVET, Levett & Daigle Architects - New Orleans, LA
Designed a 65,000 sq. ft. nursing home using DesignCAD

"Recently I worked with a firm that builds decks. They purchased your product on my recommendation. I sat down with them and in two hours they were very proficient in DesignCAD. Now they are more effective; and we can communicate... it's wonderful to be able to do a block repeat 42 times and there are 42 2x4's to make the deck!"

J. TURNER, Architect, TAO Ltd. - The Woodlands, Texas

"Allows scientists and engineers to expend minimum time learning and using CAD software so that their time can be expended on the project at hand. It also allows scientists and engineers to quickly present to management all views of a subject. (3-D)."

DR. STEVENS, NASA Space Scientist/Engineer



HOW DO I GET ONE?

DesignCAD 3-D version 2.0 is available from most retail computer stores, or you may order directly from us. DesignCAD 3-D is available in a number of foreign languages from distributors throughout the world. All you need to run DesignCAD 3-D is an IBM PC Compatible and 640K RAM. DesignCAD 3-D supports most graphics cards, printers, plotters and digitizers. Free information and a demo diskette are available by contacting us at:

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Circle 44 on reader service card

A New Kind of Home Computer

What happens when *The Manhole* meets The PC?

With advanced CD ROM technology, high-end applications stoop to conquer the low-end home entertainment market.



Stewart
Alsop

You probably haven't heard of *The Manhole*. That's because it's a Macintosh entertainment program. It runs on top of *HyperCard*, the so-called construction-set software that comes with every new Macintosh. And it comes on five 800K floppy disks and requires a hard disk (by the time you read this, it should be available on CD ROM). Not the kind of product the average reader of *PC World* would spend a lot of time thinking about.

But it is the kind of product you should at least be aware of, because it forecasts exciting developments in the PC-compatible-computer business. Those developments will probably be based on a new computer-oriented compact disk format called CD ROM XA, which stands for compact disk read-only memory, extended architecture (and is one of the finest examples of acronymic excess to be found in the computer business). CD ROM XA extends the basic way that read-only compact disks can be designed into personal computers.

Previously, computer designers thought of CD ROM drives as devices that could read data from a 520MB disk. What if maintenance manuals for Boeing 747s, the historical record of stock prices for hundreds of pub-

licly held companies, or even, gasp, every single telephone number in the entire country could fit on a single disk? Such CD ROM disks have actually been produced (with the exception, so far, of the telephone directory, given the vicissitudes of deregulation), to the great delight of Boeing 747 maintenance people and certain financial analysts.

Some designers, bored at the prospect of these disks simply holding tons of tedious data, decided to find a more interesting way to put CD ROMs to use: CD-I. Compact disk interactive is essentially a computer in the guise of a consumer-electronics device, one that looks remarkably like an audio compact disk player with a few extra buttons. Indeed, CD-I devices (which are still in prototype, nearly three years after the initial announcement) contain such computerlike components as a modified Motorola 68000 processor, a new version of Microware's multitasking OS/9 operating system, 1MB of RAM, a serial port for printers or other peripherals, plus colorful, high-resolution graphics and compact disk-quality audio.

(continues)

The CD-I innovators (working for Sony and for N.V. Philips, the Dutch consumer electronics company that invented compact disks) envisioned interactive applications where users could wander through simulated worlds, explore talking encyclopedias, and enjoy games with hundreds of scenarios, all controlled with a joystick or a mouse.

Computer designers woke up to CD-I as soon as it was announced and decided (rightly or wrongly) that this new device posed serious competition to computer manufacturers (a group that does not include Philips or Sony, notwithstanding Sony's attempts to enter the computer market). So after two years of intense negotiations and

back-room politicking, most of CD-I's main elements—including the crucial audio and graphics features—have been separated from a specific processor and operating system and freed up to be implemented on any old personal computer. This is CD ROM XA.

Now, of course, some manufacturer has to decide to integrate CD ROM XA into a personal computer (several are rumored to be doing just that, including both IBM and Sony). But it would be hard to imagine what you might do with a computer equipped in this fashion, if it weren't for Apple Computer.

Apple has provided the computer industry with a great demonstration system for the possibilities of CD ROM XA, including a Macintosh with high-

resolution black-and-white graphics; an integrated sound processor; an optional CD ROM drive; and a standard, mostly object-oriented development system in *HyperCard*. The upshot of having this demonstration system around is an innovative piece of software, *The Manhole*, the first interactive simulation that even comes close to approximating what might be possible with a computer that integrates optical storage, color graphics, and sound.

The Manhole is a world created completely in the minds of its developers, using references from children's literature. In this world, where you navigate solely (*continues*)

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PC WORLD



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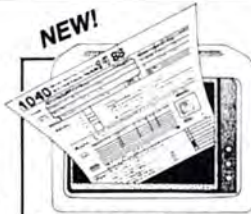
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by clicking on graphic objects on the screen, you can wander from a room where you're welcomed by a hipster dragon, to a sunken ship where a polite, slow-moving walrus escorts you, to a tower room hosted by a rabbit drinking beer and watching TV. The world is charming, engaging, and in its floppy disk version (which must be loaded on a hard disk to be used) provides about two hours of exploration and fun.

Now put *The Manhole* together with the capabilities of a standard 286-based PC equipped with CD ROM XA for about \$1500 discounted, to be delivered next fall. And they say that personal computing isn't as interesting as it used to be. Hah! ●

Stewart Alsop is editor and publisher of P.C. Letter and a contributing editor for PC World.

POWER TIP NO. 38

Now You See It With ProComm

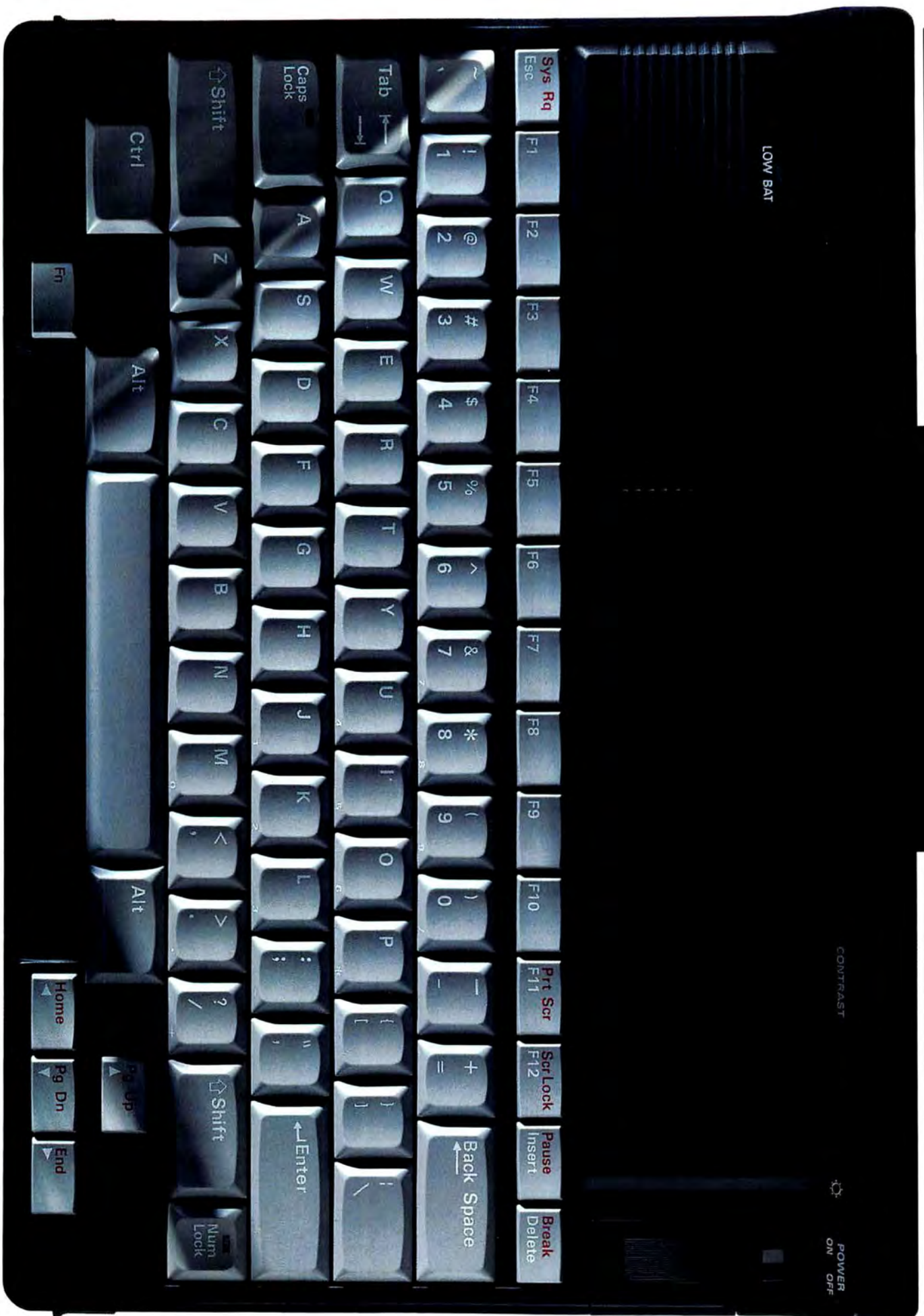
With ProComm and ProComm Plus, some monochrome monitors don't display all the text or highlighting on the help screens. If missing text is a problem, try starting the program with the /B option to use ProComm's black-and-white settings. Type ProComm/B and you'll be able to see the status line and all text.

Phil James
Director of technical support
Datastorm Technologies

Circle 262 on reader service card

Once again,
we're about to place
the future right
in your lap.





UltraLite is a trademark of NEC Home Electronics (USA) Inc. IBM AT is a registered trademark of International Business Machines Corp.

NEC
UltraLite

At NEC, we've seen the future. And it measures precisely 8.3" x 11.75" x 1.4". Introducing the UltraLite.[™] The lightest, thinnest, full-function laptop computer. Weighing in at 4.4 lbs., it boldly goes where no laptop has gone before: right in your briefcase.

Of course, the true measure of a laptop is not just its width and length. Equally important is its depth.

With a 10MHz NEC V-30 processor, the UltraLite has 90% of the power of the original IBM AT. Plus a main memory of 640K, a full-size industry standard keyboard, and built-in Microsoft DOS Manager and Lap-Link software. It also has a large, bright backlit screen that supports both text and graphics.

For storage, it has an innovative one or two megabyte silicon hard disk, which provides access to data several times faster than a conventional hard disk.

And what's more, there's also a slot for NEC's unique high-speed ROM cards which give you the opportunity to increase your storage capacity. Each ROM card contains a popular software program, yet it's about the size of a credit card.

Impressed? So was *PC Magazine*, which just named the UltraLite "Portable Computer of the Year for Technical Excellence." See your NEC dealer for a demonstration. You'll agree, when it comes to laptops, there's never been anything **NEC UltraLite[™]** quite as big.

Wherever
you can
put this
magazine,
you can
now put a
computer.

Introducing the laptop computer

Problems, problems, problems.

Computers were designed to solve them.

But sometimes they've been known to cause a few of their own. Example: You just purchased a laptop. At first, every-

thing seems fine. But

soon you want to expand your data base. Use more

sophisticated

software. Link-up to local area networks. When you realize you can't, you begin to ask yourself:

Where's the power?

Where's the expandability?

Where's the receipt?

Introducing an end to all your problems. The ProSpeed™ 286, from NEC. Weighing under 15 lbs., the ProSpeed 286 is surprisingly light. But in other areas, it's a real heavyweight. Like expandability, connectivity and speed. In fact, it offers the full functionality of a high-

performance desktop. The

ProSpeed comes equipped with one megabyte of memory that's expandable to five.

And, it comes with either 20 or 40 megabyte hard disk drives. There's even an advanced model that provides a high-speed 100 megabyte drive for special applications.

As for its display, it clears up a very serious problem: clarity. NEC's Monograph™ CTN screen gives you crisp, backlit images that provide CRT quality with VGA resolution.

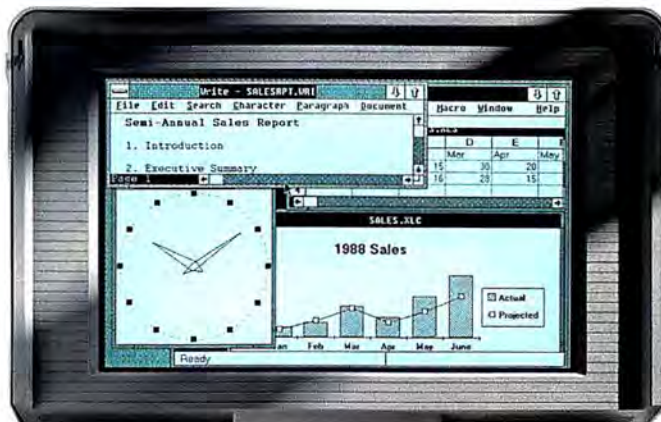
For power-hungry executives, the ProSpeed 286 is powered by a CMOS 80286

processor running at 16MHz. Meaning it's fully capable of

The ProSpeed 286 screen is so clear and crisp you can even display multiple windows.



The ProSpeed 286 Expansion Station gives you the flexibility and expandability of a high-performance desktop computer.



that solves problems others can't.



The ProSpeed 286 runs at 16MHz. It's the fastest 80286 laptop around.



such as
Microsoft
Excel. And then
there's the ever-
expanding problem of

expansion, for which NEC has
developed a unique solution
called an Expansion
Station.* It's an innovative
system that includes four stan-
dard slots, one standard
drive bay, a power supply
and permanent con-
nections for both
printer and serial devices.

*The ProSpeed 286
features a full-
function keyboard
with standard
spacing.*

handling
the most demand-
ing DOS applications.
Not to mention OS/2 Presentation
Manager and Windows applications

DOS,
Windows
and Microsoft
Excel are reg-
istered trade-
marks of the
Microsoft Corp.
OS/2 is a trade-
mark of International
Business Machines
Corp. WordPerfect is a
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WordPerfect Corp. Paradox
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Admittedly,
there's one problem we
can't solve. Whether to use
the ProSpeed 286 as a laptop
or desktop?
That's one you'll just have to
tackle yourself.

NEC ProSpeed™ 286



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In order to make the ultimate desktop comp

Our sincere apologies to desk makers everywhere.

But when we set out to make the ultimate desktop computer,

we knew it had to have three critical components. Awesome power. Unequaled expansion capabilities.

And most importantly—a handle.

Introducing the ProSpeed™ 386 from NEC. The first personal computer to offer the portability of a laptop and the power of an 80386 desktop.

With the ProSpeed 386, the designers at NEC did more than create a new computer. They

You've never had this much power sitting in your lap.

established a new class of computers—the first modular workstation.

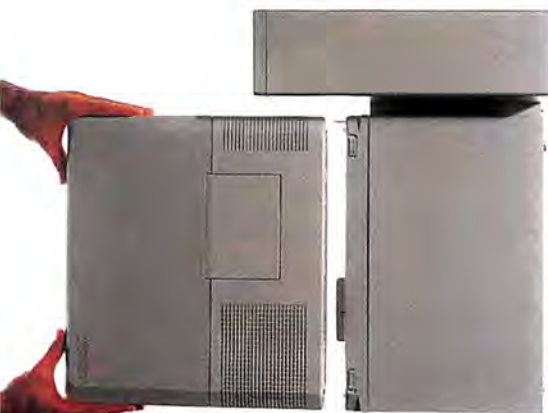
To realize how this can benefit you in the future, let us remind you how it was in the past.

With ordinary laptops you had to hook and unhook peripherals, phone lines and all sorts of cables every time you left the office.

But thanks to a revolutionary Docking Station™ design, the ProSpeed 386 leaves all that behind.

You simply slide the laptop out of the Docking Station, and then slide out of your office. Leaving all your connections connected for when you return.

And saving yourself



Snap the ProSpeed 386 into the Docking Station, and it's a desktop. Snap it out and it's a laptop.



uter, we had to remove one major obstacle.

one of the most precious commodities of all—time.

Most importantly, the Docking Station can accommodate a full range of expansion options; it has four full-size card slots, and two standard drive bays for tape back-up, CD-ROM or 5¼" floppies.

Take away the Docking Station and what have you got? One of the world's most powerful laptops.

Running at 16MHz, it offers two megabytes of 32-bit memory that's expandable to 10.

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As for its 10½" diagonal black-on-white display, it's positively brilliant.

Advanced screen technology delivers a paper-white image and EGA resolution.

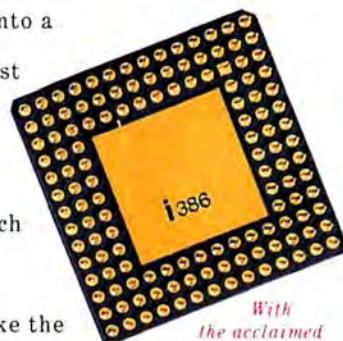
In more ways than one. NEC's advanced screen technology, called Monograph™ CTN, provides CRT-quality video with a paper-white image and EGA resolution.

Which translates into a higher level of contrast and increased resolution for graphics-oriented programs, such as Windows.

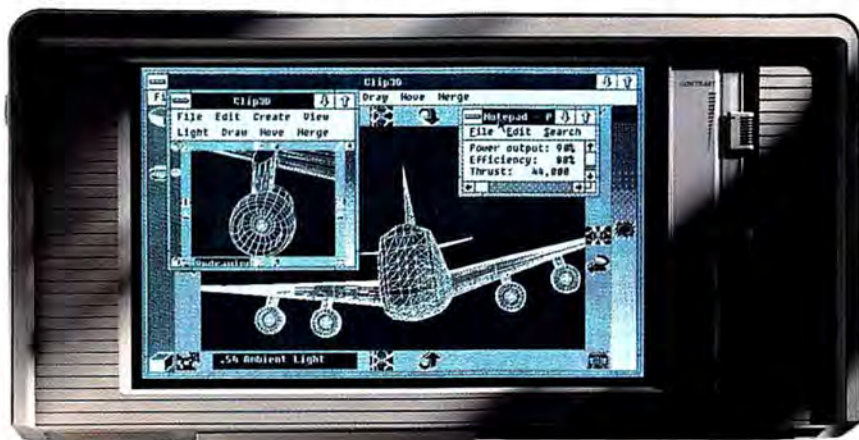
Which helps to make the ProSpeed 386 not just the ultimate desktop, but the ultimate value. Whether your

desk has four legs or just two.

NEC ProSpeed™ 386



With the acclaimed 386 chip, ProSpeed delivers exceptional speed and full multi-tasking capabilities.



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*ProSpeed™ 286.
The fastest
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Edited by ERIC BENDER

Multivendor Support Broadens

Novell Focuses on Network Software

Aims to Simplify Operations



The biggest challenge, says Ray Noorda, will be to deliver on Novell's far-flung product promises.

How fast has Novell grown? This year, the network specialist is likely to sell more PC software than Ashton-Tate.

While the sheer diversity and complexity of the never-ending *NetWare* product stream might baffle and intimidate all but veteran networkers, Novell remains sharply focused on offering a coherent, open platform for network computing. *NetWare* connects more than 3 million workstations, and in six years it has carried Novell across the \$300 million sales mark.

"Novell began creating universal standards and a universal applications environment before other

companies latched on to that concept," remarks Clare Fleig, director of research at International Technology Group in Los Altos, California. For *NetWare*, that consistency has paid off in a loyal following among sophisticated resellers and application software vendors—as evidenced by more than 5000 *NetWare*-specific products. "Developers can't ignore that marketplace," adds Harry Saal, president of Network General, a network utility firm in Sunnyvale, California.

In addition to its highly lucrative software, Novell offers a broad range of net hardware. The line's profits, however, are disappointing, and Novell is actively slimming down

its offerings—taking a \$10.2 million write-down on its inventory last fall. "We're shifting to software a little faster than expected; it's about 65 percent of our business now," says Ray Noorda, Novell's softspoken 63-year-old chief executive.

But even as business booms, Novell finds itself in a war of words with other net vendors over the small OS/2 network market. The Microsoft/3Com *LAN Manager* camp claims that the ability to run the same operating system on workstations and servers will smooth the path into distributed applications.

Unlike its rival, however, *NetWare* is not optimized for OS/2; instead, the software provides network functionality and performance on a variety of servers (including, in an upcoming release, 80386 machines). It offers basic file/print services for OS/2 workstations, along with a menu of tools and hooks for building distributed applications. In addition, Novell will soon release *Nondedicated NetWare*, which lets OS/2 run on a *NetWare* server, but Noorda downplays its importance.

IBM is building its OS/2 network software around the Microsoft package, and Microsoft claims that the rapidly developing standard will exclude *NetWare*. Novell retorts that it will support IBM's key interfaces soon after they appear—as it did a few

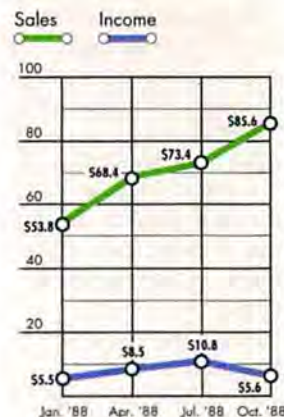
Norton Strengthens Utilities

Disk Recovery Still Central

Comedian Rich Hall defines an *ohnosecond* as that sickening moment between the time you realize that you're about to lock your keys in your car and the time the door slams.

Peter Norton has worked for the past six years to eliminate the *ohnosecond* from the PC world. One of the industry's first heroes, Norton (*continues on page 68*)

Novell Sales Rise Steadily (in millions of dollars)



Novell's sales keep climbing, although income suffered in the latest quarter as the network product supplier took a \$10.2 million write-off on hardware inventory.

Hit by VGA, Hercules Pushes Low-End Sales

Promotes Speedy RamFont Displays



Hercules has shifted toward cost-sensitive customers, says Andrew Fischer.

Started in a California garage, this company brashly ignored IBM while setting its own industry standard for sharp graphics. And it succeeded in doing just that.

But the similarity with Apple Computer ends there, because in the past two years, Hercules Computer Technology has faded from the spotlight.

During its heyday, the Berkeley, California, company dominated the market for PC add-on graphics boards. In 1982, Hercules introduced the first graphics board that enabled IBM PCs to display sharp, high-resolution graphics on monochrome monitors, and it caught on as a de facto standard.

After Hercules debuted a color card in 1984, PC

World readers preferred it to IBM's in the World Class Awards balloting. In 1986, Hercules unveiled RamFont, a hardware/software combination that enables users to display a rich mixture of text fonts and character attributes without losing the speed of text mode.

Cofounders Kevin Jenkins and Van Suwanukul, who started Hercules with just \$23,000, pushed sales to about \$70 million in 1986. Things were going so well that Jenkins retired at the ripe old age of 32. He took his family to Mexico, where he bought a boat and a beach.

But at virtually the same time that Jenkins left, IBM introduced the

(continues)

Novell

(continued)

years back with IBM's PC LAN Program, moving faster than the Microsoft licensees.

Still, Fleig sees Novell heading into a brawl in corporate networking—with IBM. "Novell is not necessarily vulnerable in 1989," she suggests, "but it's probably very vulnerable in 1990 and later, because of the shift to OS/2 Extended Edition. What IBM is doing is huge and strategic—a whole new architecture. Novell has been saying 'We can do the job better than IBM.' That will be a harder sell."

Noorda concedes that IBM will continue to be a major competitor, but he insists that the move toward large and complex corporate environments opens up new ground, especially where the ability to accept non-IBM computers like the Macintosh is concerned. "We're far more flexible than IBM," he contends.

While many see Novell and 3Com as head-to-head adversaries, Noorda says that 3Com, with its heavy concentration on hardware, is not his firm's real competition: "3Com is more a Hewlett-Packard look-alike; we look more like Microsoft and other software firms." Novell does find itself increasingly competing with another hardware vendor—Digital Equipment. Fleig and other observers also see Banyan Systems of Westboro, Massachusetts, posing an increasing threat with its *Vines* software, which was designed from the beginning for large corporate nets.

Novell's entry-level network contender, *NetWare ELS*, produced a surge of orders when it was introduced in 1987 and has been upgraded many times since, says Noorda. However, Saal maintains that Novell hasn't made it entry-level in all aspects. Without greater ease of use, he argues, "there's a potentially huge additional market that they're not addressing."

One reason Novell doesn't heavily target the low end of the market, Fleig notes, is that it has painstakingly built up a group of technically adept resellers. "This isn't like selling shoes; you really have to understand the technology," she remarks. But these resellers aren't keen on low-end products.

Overall, Noorda expects Novell to grow between 30 and 50 percent this year. As it becomes more entrenched in corporations, "the marketing issues are getting less complex," he says. Development becomes more critical; "our greatest vulnerability now is execution."

Running a 1500-employee firm from Provo, Utah, has its drawbacks, Noorda agrees, including difficulty in attracting management talent. Part of Novell's response is to distribute resources elsewhere—particularly Austin, Texas (home of the development tools division), and Santa Clara, California (headquarters for the connectivity division). Another part of the solution, he says, is "to simplify the company. Reducing the hardware portion is a great simplification." —E. B.

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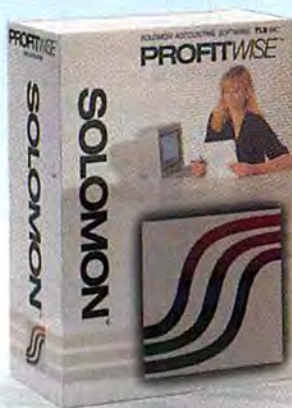
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Nestor Aims to Achieve Neural-Net Recognition

Into the Black This Year?

After winning a Nobel Prize for superconductivity research, Leon Cooper joined another Brown University professor to create computer models of the human learning process. That work led Cooper and his partner, Charles Elbaum, to form Nestor, Inc., the leader among more than a hundred start-ups hoping to get rich on neural network technology.

Although it has not turned a profit since it in-

corporated and went public in 1983, the Providence firm is successfully building applications to solve business problems that elude traditional algorithmic or rule-based expert systems.

Michael Buffa, Nestor's president, credits Yankee frugality for the company's healthy balance sheet, which includes a 9-to-1 ratio of equity to debt. Although losses remain heavy, Buffa expects



Nestor's Leon Cooper can point to successful PC prototypes.

to stem the flow of red ink by midyear, unless the company decides to expand its 34-person staff to handle an upcoming military contract. "That may postpone profitability by

one quarter, but it's not years away, it's quarters away," Buffa says.

Nestor's first product was a character recognition system that turns letters written on a digitizing pad into machine-readable ASCII characters. Nestor is negotiating a marketing agreement with a large computer vendor, Buffa says, because it's too small to do the job itself.

The firm has also tackled speech and object recognition, process control, financial decision making, risk assessment, and forecasting. In each job, the key to success is the neural net's ability to detect *(continues)*

Hercules

(continued)

PS/2 and put its VGA graphics on every motherboard—eliminating the need for add-on graphics boards.

"Our largest market disappeared," admits Andrew Fischer, vice president of product development. "Early 1987 was certainly the height of our fortunes." While the company declines to reveal sales figures, Dataquest analyst Sohail Malik estimates 1987 sales at \$45 million and figures that they dropped slightly in 1988.

But Fischer insists the 80-employee company is still very profitable. That's because it continues to sell thousands of monochrome boards a month, while competitors focus on the color market.

"Color is really a nonessential," Fischer says. A business that wants to run *1-2-3* or *WordPerfect* with EGA or VGA color, he claims, must spend almost three times as much as it would using monochrome. "That's why monochrome will never go away," he says confidently.

Competitors chuckle at that line of reasoning, saying it shows how far behind the times Hercules has slipped. "They are long gone; we don't even see them anymore or regard them as one of our major competitors," snorts Greg Reznick, marketing vice president at Video Seven in Fremont, California. Though Hercules introduced color boards, it ignored the EGA market and failed to unveil a VGA clone until last fall—long after competitors.

"They missed the boat on the color market," according to Dataquest's

Malik, who estimates that about 40 percent of all PC displays are monochrome.

Hercules continues to offer intriguing products, like the Network Card Plus with built-in AppleTalk capability, which debuted last year. But the company's ability to set standards seems far less certain than in the free-wheeling days when Jenkins, his ever-present sunglasses, and his English bull terrier Pinkie dominated Hercules' marketing efforts.

For now, Hercules is counting on producing profits in three ways: selling even more monochrome cards for the hundreds of thousands of IBM PC compatibles consumers purchase each year, offering its inexpensive (\$299) plain-vanilla VGA board, and trying to establish RamFont.

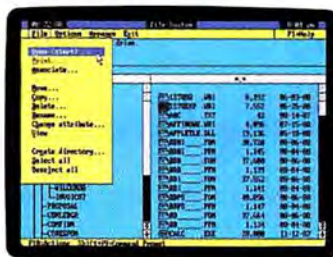
WordPerfect, *Microsoft Word*, *WordStar 2000*, *Sprint*, *Framework III*, *XyWrite III +*, and *Sanna Word IV* take advantage of RamFont. But given the turn toward graphics software, most see RamFont ending up as a low-end DOS product. "It does some nice things in the character-based environment, and we support it for *Microsoft Word*, but when you get into the graphics environment it doesn't do that much," a Microsoft spokesperson says.

Few, though, count Hercules out altogether. "They had a hit, then a strikeout," says Dataquest's Malik. "But in PC graphics, they are not anywhere near the last inning. The third phase of graphics is yet to come; they have another chance." —John Eckhouse

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Nestor

(continued)

patterns or classifications in huge volumes of raw data—a task conventional computers fail at miserably (see “Neural Nets: The Dream Machines,” *PCW*, December 1987).

Nestor's core products are the Decision Learning System (DLS) and the Nestor Development System (NDS). DLS is targeted at the financial services industry, where the ability to see patterns in data is of enormous value. (One example: Mortgage defaults in the United States exceed \$2 billion per year, and identifying even a fraction of potential bad loans would aid any mortgage company.) Nestor negotiates a license and royalty arrangement for DLS based on the estimated value of the resulting application.

One DLS licensee is the New York firm of Oliver, Wyman and Company, a management consultant for the credit industry. Partner Peter Carroll says the choice of neural nets “seemed obvious, once we realized they are very good at pattern recognition.”

Initially, Carroll says, building a mortgage-underwriting expert system with a neural network is similar to creating a rule-based expert system: The developer asks the human underwriters what data they rely on. However, it's not necessary to know the data's significance or how it's employed. The network scans a data base of mortgage applications and lending decisions, then finds the relationship itself. “The biggest prob-

lem is finding data, not training [the neural net] or understanding the concepts,” Carroll says.

Outside the financial services industry, Nestor sells its other product, NDS, at \$495 per copy and more. The company also provides customer training and consulting.

Dallas-based BancTec, for example, is using NDS

to develop financial document processing systems. The BancTec system reads handwritten numbers on checks, reducing labor needed for check processing by up to 60 percent.

BancTec's document processing division vice president and general manager, Richard

Thompson, is reluctant to predict the project's success, but he's satisfied with its progress. BancTec plans beta site installations by midyear. “If it's successful,” Thompson says, “it will mean a significant reduction in the number of keystrokes required to process a bank check.” —*Mickey Williamson*

Wang Forms PC Division

Trying Central Phone Support

Granted, it had sold almost half a million PCs. And its annual PC revenues were reaching \$400 million. But the \$3 billion office automation supplier knew it hadn't really joined the PC parade, and so Wang Laboratories formed a separate PC group last May.

Like its parent, Wang's Microsystems Division will hawk high-powered, well-connected PCs for corporate users. But prices will dip closer to those of mail-order marketers like Dell, says Graham Beachum, Jr., the division's vice president of sales and marketing.

Wang's first 80386-based machines rolled out in December with price tags beginning at \$4115 for a system with a VGA monitor. “For Wang, that's aggressive,” a spokesperson notes.

The Microsystems Division swiped another mail-order tactic: It will provide product support nationwide from a phone bank at its Drum Hill, Massachusetts, headquarter-



Bob Ano is combining Wang technology with mail-order tactics.

ters. In other respects, though, the group will flex traditional big-supplier muscle, fielding a direct sales force of 100. The group will also market through value-added resellers. Both channels will turn over support duties to the Drum Hill operation, Beachum says.

Industry analysts caution that Wang must offer more than cost-competitive products. “Everybody is selling hardware cheap,” argues Michael Goulde, director of corporate information solutions

at CAP International in Marshfield, Massachusetts. However, Robert Cameron, senior analyst with Dataquest's Boxboro, Massachusetts, office, feels that Wang's ability to sell more than just PCs is attractive because “people like to buy everything from one vendor.”

Wang also can tap its comprehensive set of office automation offerings, currently highlighted by the Wang Integrated Image System (WIIS). Based on Wang VS minicomputers, the image system will help Wang sell PCs for use as WIIS workstations, Cameron believes.

Goulde agrees, but criticizes Wang's failure to develop proprietary chips to give its PCs the better-than-VGA graphics that WIIS needs.

In networking, however, Wang is already well positioned. “Wang initially viewed PCs as workstations for the VS, and about 65 percent of our PCs have been sold as desktop devices connected to a VS environment,” points out Bob Ano, president of Wang Microsystems. Wang will ex-

(continues)



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Norton

(continued from page 61)

made his reputation with *The Norton Utilities*, a package of disk and file recovery routines that have gone a long way toward reducing pain and suffering among personal computer users.

For a few years, Norton gave computer publications as much attention as his *Utilities*. But he turned away from writing in 1987 to devote more time to his "main gig," Peter Norton Computing.

The company has grown to 50 employees and annual revenues of about \$15 million, up about \$4 million from the year before. The *Utilities* accounts for 80 percent of shipments; sales are growing "at a shocking rate" for the *The Norton Commander* (a DOS shell utility), *The Norton Guides* (pop-up reference manuals for computer languages and operating systems), *The Norton Editor* (a small ASCII word processor for developers), and *Dan Bricklin's Demo Program* (a prototyping and demonstration tool).

The company, which dominates the world of file recovery in the United States, is expanding into Europe and the Far East—but not without some interesting problems.

The Spanish version of *The Norton Commander*, for instance, is called *El Comandante Norton*. "At first," says the unassuming Norton, "I was afraid that it would seem militaristic, but I find there's more of a lilt to saying *comandante* than saying *commander*."

As part of its diversification, Norton Com-



Peter Norton still concentrates on meeting mainstream needs for managing DOS.

puting is dipping a toe into the OS/2 waters—but only a toe. Although the firm was an early player in the OS/2 game with *The Norton Guides*, "we're not making a major, major commitment to it. The question is, who

needs to use OS/2? The needs are in DOS."

When asked about utilities for managing local area networks or multi-user systems, Norton laughs and says only that "you can look for some

Wang

(continued)

tend this original network strategy to include versions of *OS/2 LAN Manager* and *Banyan's Vines* network software.

The company also enjoys extensive cross-licensing agreements with IBM, which Beachum says would pave the way for machines compatible with the Micro Channel Architecture. Outsiders expect the firm to launch such products by midyear.

In its bid to sell more PCs, Wang has another powerful weapon: *Freestyle*, a communications system that lets AT own-

ers use an "electronic pencil" to quickly append written or spoken notes to documents or other files, and then mail the notes electronically. "It's the applications that sell the hardware, and *Freestyle* has lots of sex appeal and flash," Cameron observes.

Presently, *Freestyle* continues a Wang tradition of high cost (a fully configured system with \$12,000) and half-steps toward industry standards (it works only with Wang proprietary networks). But Cameron predicts Wang will cut *Freestyle's* price, and Wang says it will adapt *Freestyle* for the OS/2 Presentation

very interesting things from us."

Norton's firm is not alone in its niches. But the *Commander* is "far and away the leading disk management program," says Peter DeWitt, a product manager for Corporate Software in Westwood, Massachusetts. *The Norton Utilities* has lengthened its lead, he adds, thanks to automated disk recovery and fortuitous delays to a competing program, Central Point Software's *PC Tools*.

Norton sees his products as targeting the mainstream of the disk recovery market, while Paul Mace Software's *The Mace Utilities* is aimed at techies and *PC Tools* goes for the budget-minded.

"It works out less as competition than as market segmentation, which is dandy, because it's really serving the customer very well." —Daniel J. Rosenbaum

Manager. Even more important, the Microsystems Division is developing a *Windows* ease-of-use extension that accepts unmodified *Windows* applications—another sign that Wang is ready to play in the open architecture arena. —Edward Warner

John Eckhouse reports on business for the San Francisco Chronicle, Daniel J. Rosenbaum frequently contributes to *PC World*, Edward Warner is a freelance writer based in Boston, and Mickey Williamson has written extensively on artificial intelligence. ●

TWO-FISTED MANAGEMENT

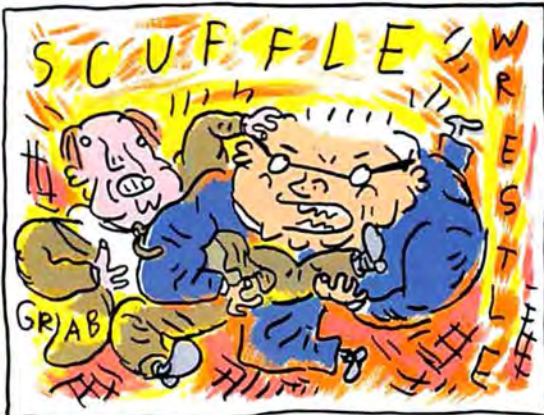


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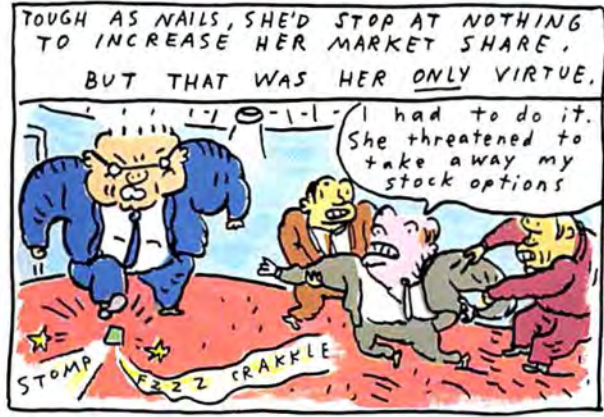
Mark, 32



We have a security leak!



IT COULD BELONG TO NONE OTHER THAN MR. HARRIS' ARCH-ENEMY, DRUSILLA DRUCK III, CHAIR PERSON OF CHEMO INDUSTRIES.



I had to do it. She threatened to take away my stock options

A Few Words Most Celebrated



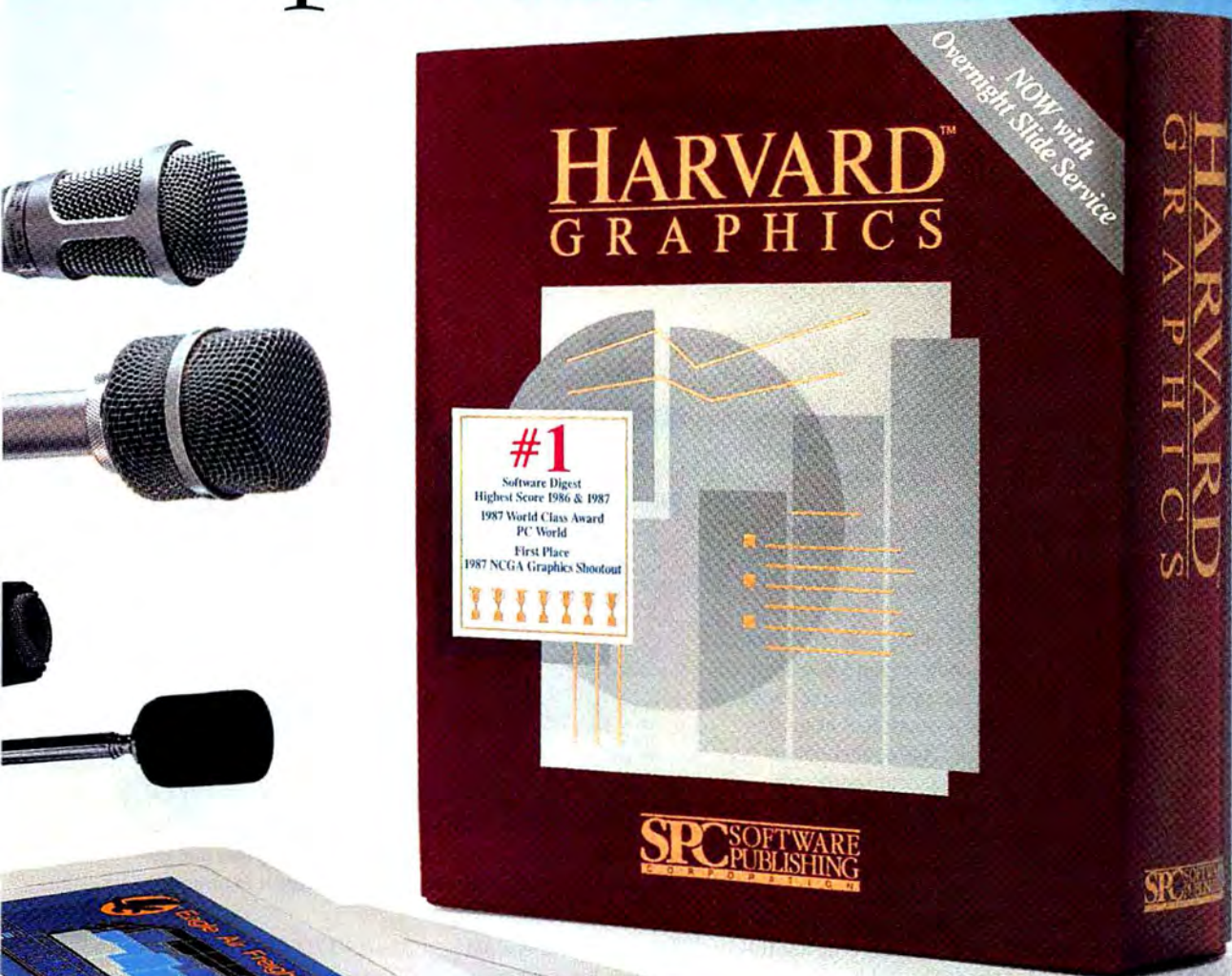
Thank you. For those of you who haven't heard, Harvard Graphics from Software Publishing has gotten a lot of recognition from the trade press. Why, you may ask? Certainly our crisp, high-speed output helped influence InfoWorld readers to name us Product of the Year. And the easy access to so many chart

and graphing options must have helped PC World's audience give us their World Class Award for the second year running.

Actually it must have been all those things and more. Otherwise why would PC Magazine call Harvard Graphics "the de facto standard" software for business graphics?

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Magellan Finds Faster Work Routes

Lotus's navigator gives you clear sailing to any file on your hard disk—

and keeps your disk trim into the bargain.

Eric Bender

Nature abhors a vacuum, and so does a hard disk. If you've been running more than one application for any appreciable length of time, your disk is probably stuffed with hundreds or even thousands of files in diverse formats. And when you're in a big hurry to find one file in particular—say, a five-month-old memo—you need a guide like Lotus's *Magellan*.

Magellan strives for mastery over this world of dissimilar files, helping you quickly find what you need and assert control of everything under the hatches. It's a powerful PC navigation center that lets you rapidly read files from numerous popular applications, search text

PC World previews are informal assessments of products that at press time were still in the development stage. Complete reviews—including features evaluations and performance testing—will appear only after a product is officially released.

via an innovative indexing scheme, and issue snappy DOS commands.

Skimming O'er the Maze

Magellan opens with two windows, split vertically. The one on the left shows a list of files, and the right window, called View, displays the contents of each file—regardless of its format. This almost instantaneous translation can save you substantial amounts of time. You can zip through a crowded directory with one eye on the View window, rather than puzzling over whether you're looking at, say, a *WordPerfect* or *Word* document and then loading the appropriate application.

A list of function key assignments is ever-present along the bottom of the screen; a second row pops up when you hit <Alt>. These keys and a judicious handful of dialog boxes are all you need to



Magellan offers easy-to-use tools for locating files and displays file contents almost instantly, regardless of format.

know, which keeps *Magellan's* learning curve low.

A status line at the top of your screen displays the exploration path that produced the list of files in the left window. If you want to limit the list, say to 1-2-3 worksheets, you can type in a new path like c:\123*.wks, or sort the list by path, extension, or other parameters. *Magellan* recognizes DOS wild cards and adds some ingenious file-finding shortcuts of its own:

c:\LOTUS**.wk?, for example, would ferret out every spreadsheet in every subdirectory of the \LOTUS subdirectory on drive C:. Another route is through the Explore function, which brings up a dialog box offering you a choice of file groups. You can select from the many built-in menu choices; you also can define file groups quickly.

Once you've found the proper file, you can en-

large a window or even zoom it to full screen—to find the file size or date, or see the contents in its entirety. Moreover, the package allows you to mark sections of text throughout your disk and gather them together into an ASCII file without disturbing the original files.

If you want to edit or change a file, you can launch directly from *Magellan* into the appropriate application—assuming it's installed on your hard disk. (*Magellan* checks your disk at installation and modifies the Launch menu appropriately. As with *Explore*, you can easily attach packages that aren't already on the menu.) The application comes up with the file already loaded. When you exit that package, *Magellan* reappears.

Search Me

Magellan adds an innovative text-search capability aimed at overcoming two restrictions on current text-search packages like Microlytics's *Gofar*: the awkwardness of using Boolean tools, and the limited speed of sequential file searches.

Naturally, Boolean techniques are essential for narrowing searches of massive data bases like those on Dow Jones News/Retrieval. But Lotus maintains that Boolean commands are not particularly intuitive—an argument supported by many

who find on-line searches only slightly less intimidating than particle physics.

Instead, *Magellan* employs a "fuzzy searching" technique based simply on a few likely words or phrases. To begin the search, you first pick the file group in the *Explore* dialog box and then type in a series of words likely to appear. *Magellan* produces a weighted and ranked list of files expected to produce matches. You can then browse the files via *View*.

You also can begin your search with a line or marked passage of text. Or you can build a Boolean search on the *Explore* line with AND, OR, and NOT operators.

Before embarking on a fuzzy search, though, you'll have to index your files. *Magellan*'s indexing scheme accelerates searches and takes minimal disk space, roughly 6 percent of the size of the indexed files. The initial indexing can take a while, depending on the number of files and your hardware configuration. Indexing 651 files on a Compaq Portable II, for example, required a little under 20 minutes. You update the index incrementally whenever you like.

On a large disk containing thousands of files, searches can dawdle. In these circumstances Lotus suggests creating more focused indexes. These indexes also enable you to distribute custom-

ized data bases to other *Magellan* users: You build a group of files, index that group, and then copy all to a floppy disk.

Macros Round the World

Magellan offers command line shortcuts, like starting up with *mg *.wks* concerning "sales". Additionally, you can write macros via a learn mode or simple commands—so the program opens with worksheets sorted by date, for instance.

The package does not compete with hard disk maintenance utilities like *The Norton Utilities*, but it does incorporate standard DOS shell capabilities, including tree directory displays plus the ability to copy, delete, and rename files, singly or in batch mode. *View* also helps you run a tighter ship by letting you instantly view files whose names offer no clue of origin.

Like its namesake, who stepped onto the wrong beach one day in 1521, the precommercial *Magellan* doesn't always complete its voyages. Support for many popular packages is not entirely implemented, and the software is too RAM hungry to work with many memory-resident packages like *Lotus Express*, although the company says it will solve both problems with the shrinkwrap version. The package also will face

competition from upcoming offerings like *Traveling Software's Papillon*. But *Magellan* looks like a strong and savvy pilot. ●

Eric Bender is PC World's East Coast editor.

SNAPSHOT

Magellan

Lotus's utility charts courses through your hard disk, helping you find information, view files, and organize the disk.

KEY FEATURES

- Displays contents of files from many popular applications in less than a second
- "Fuzzy searches" locate any textual information on a hard disk
- Text-gathering from multiple files
- DOS shell capabilities

AVAILABILITY

Scheduled for first quarter 1989

PRICING

\$195

Lotus Development

55 Cambridge Pkwy.
Cambridge, MA 02142
617/577-8500

For more information, circle 710 on reader service card.

SideKick for Presentation Manager

For a glimpse at computing in the nineties,

look no further than Borland's SideKick for Presentation Manager.

Eric Knorr and
Karl Koessel

We've seen the future: It has stunning graphics, requires at least 3MB of RAM, and does a little less than it once did.

Yes, *SideKick for Presentation Manager* is here, the first application available for OS/2's Windows-like front end. Now shipping free with IBM OS/2 1.1 Standard and Extended Editions, the program reinvents versions of the original *SideKick*'s Calculator, Notepad, Time Planner (derived from the original Calendar), and Phonebook.

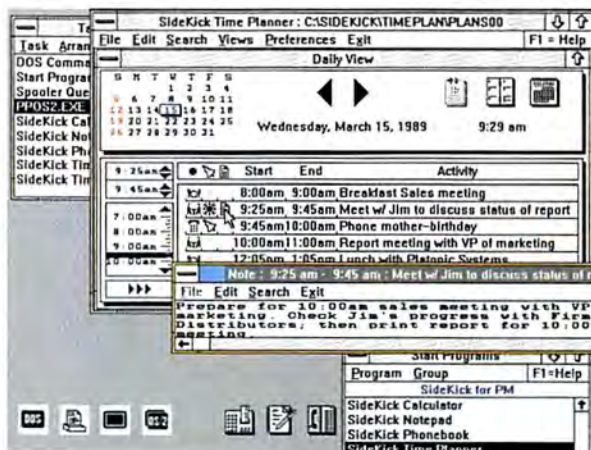
You can't really call *SideKick for Presentation Manager* a utility. It's a completely rewritten product built around the *Paradox* data base engine, with the Phonebook and Time Planner employing *Paradox*'s file format. And OS/2 multitasking renders "RAM resident" obsolete; you execute this *SideKick* like any other program.

Brave New Environment

If looks count, then *SideKick for Presentation Manager* leaves just about any DOS application—including most *Windows* programs—in the dust. The attractive user interface makes liberal and intelligent use of icons and fonts, and it's simply a pleasure to use.

As you'd expect of any OS/2 application, installing *SideKick* is a one-button affair. The program automatically creates a directory and five subdirectories whose files together occupy about 2MB of disk space. It also adds the names of the four *SideKick* applications (as a "Group") to the Start Programs menu and slugs a statement into OS/2's CONFIG.SYS file.

Although the minimum RAM requirement for *SideKick* with Presentation Manager is 3MB (and that's without the DOS compatibility box), 4MB is recommended. Needless to say, you also need an 80286 machine or better



A Time Planner alarm has just gone off. Clicking on the adjacent note icon opens the appointment's attachment in a Notepad-like word processor. Notice also the Calculator, Notepad, and Phonebook icons.

to run OS/2, and the program itself is available only on 1.2MB or 1.44MB floppies. VGA rather than EGA graphics resolution is also advisable just for deciphering some of the minuscule icons. A mouse is almost a necessity.

More Than a Face-Lift

The Calculator and the Notepad have always been the most popular *Side-*

Kick applications, and *SideKick for Presentation Manager* gives each a new face and new capabilities.

The Calculator now looks like a snazzy, high-tech calculator, replete with a host of special function keys and an editable tape. You can "press" the keys with a mouse or

use the keypad; the numbers scroll by on the tape, which can be saved as an ASCII file.

Borland dubs the Calculator a "one-column spreadsheet." Unlike the editable tape generated by *SideKick Plus's* Calculator, *SideKick for Presentation Manager's* tape recalculates instantly when you alter entries or operators. You also can save a whole array of tapes for various applications and edit them as required. Additionally, a "memory box" displays the contents of the Calculator's memory, while new business functions let you calculate payments at the beginning or end of a payment period.

Changes to the Notepad may irk some users. The *WordStar*-like editing commands have been discarded in favor of *Presentation Manager* conventions, which include selection of text and commands with the mouse and simple keystroke combinations for cutting and pasting. The Notepad will accustom you to the basic commands for all future *Presentation Manager* word processors—whether you're ready or not.

The Notepad supports ASCII documents of up to 64K. It offers tabs and search and replace functions but doesn't accept wild cards. The *Presentation Manager's* Clipboard

—a window for cutting and pasting data between OS/2 applications—performs roughly the same screen-capture tasks as the old *SideKick's* Notepad. Together, the Clipboard and one or more sessions of the new Notepad can work like a word processor with windows.

The Organizing Principle

Of the four applications, the Time Planner is the most complicated to learn. It offers daily, weekly, and monthly views of your schedule, and lets you attach notes, perform searches, and set appointment alarms.

To record an appointment, you begin by double-clicking on the preferred day and selecting a time period on a graphical "time odometer." Confirming the range creates an entry on the daily calendar, which can hold a frightening 256 appointments per day.

You have a choice of ten tiny category icons to classify the type of appointment—symbols for business meetings, meal-time appointments, phone calls, and so on. One icon indicates that an alarm has been set, while another type shows whether a note is attached (notes are recorded and retrieved via the Notepad).

One of the flashiest features—also offered by

SideKick Plus—is a search function that finds unscheduled time based on such criteria as length of the appointment, time of day, and day of the week. You can also search for text strings and go to specified days.

Additionally, the Phonebook can search across multiple fields. In fact, like *SideKick Plus's* Phonebook, it is actually a rudimentary flat-file data base, providing both form and table views. But *SideKick for Presentation Manager* adds the ability to customize the data entry form and to rearrange columns in the table. You could even turn the customizable Phonebook form into a front end for *Paradox for OS/2*.

The Phonebook holds up to a billion records and includes a handy speed-dial list for common numbers. Unlike earlier versions, however, it won't let you simply pop into another application, select any number on the screen, and dial it.

SideKick for Presentation Manager lacks the minimal telecommunications program and the outliner bundled into *SideKick Plus*. These missing pieces won't bother most *SideKick* users, since few switched to the *Plus* version anyway. More important, this big, hardware-hungry program needs about 20 times the RAM of its immediate predecessor, and

it does less—although with greater ease and elegance. And that, in the near term, is the shape of things to come. ●

Eric Knorr is a senior editor and Karl Koessel is technical editor for PC World.

SNAPSHOT

SideKick for Presentation Manager

The first *Presentation Manager* package, *SideKick* recasts the applications that made the DOS version famous.

KEY FEATURES

- Calculator, Notepad, Time Planner, and Phonebook applications
- Clear, easy-to-use interface fully exploits *Presentation Manager* conventions
- File format compatibility with *Paradox*

AVAILABILITY

Immediate

PRICING

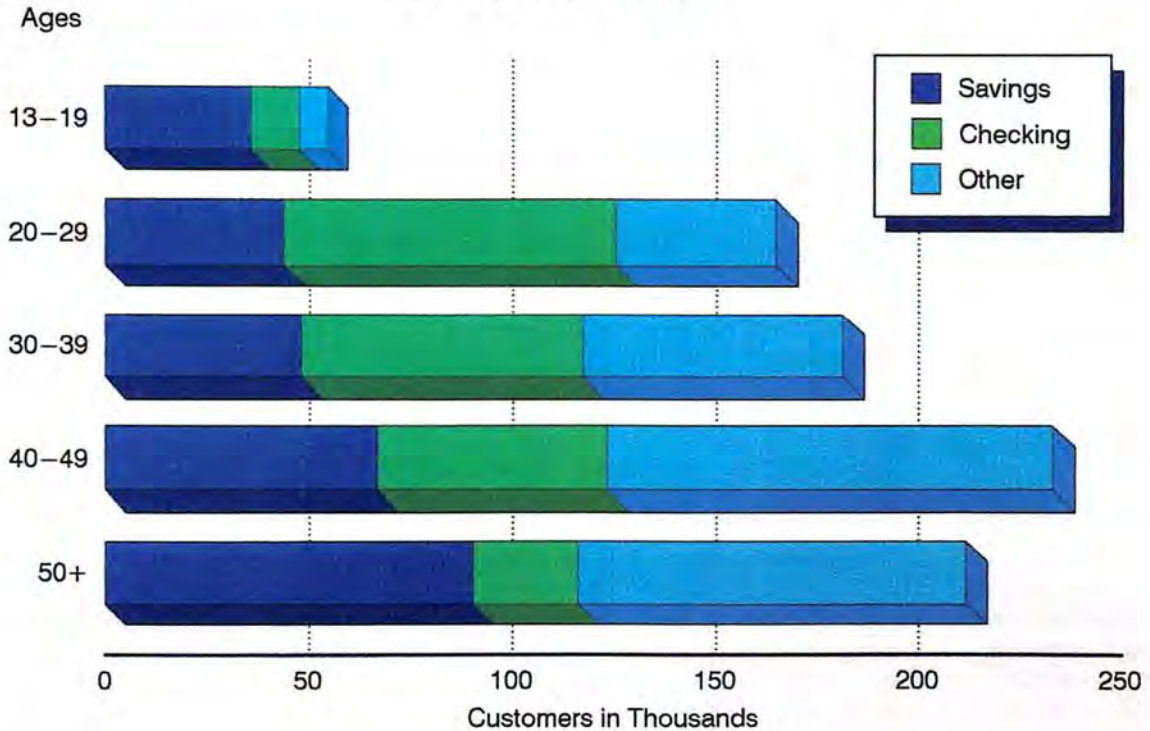
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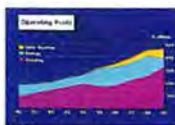
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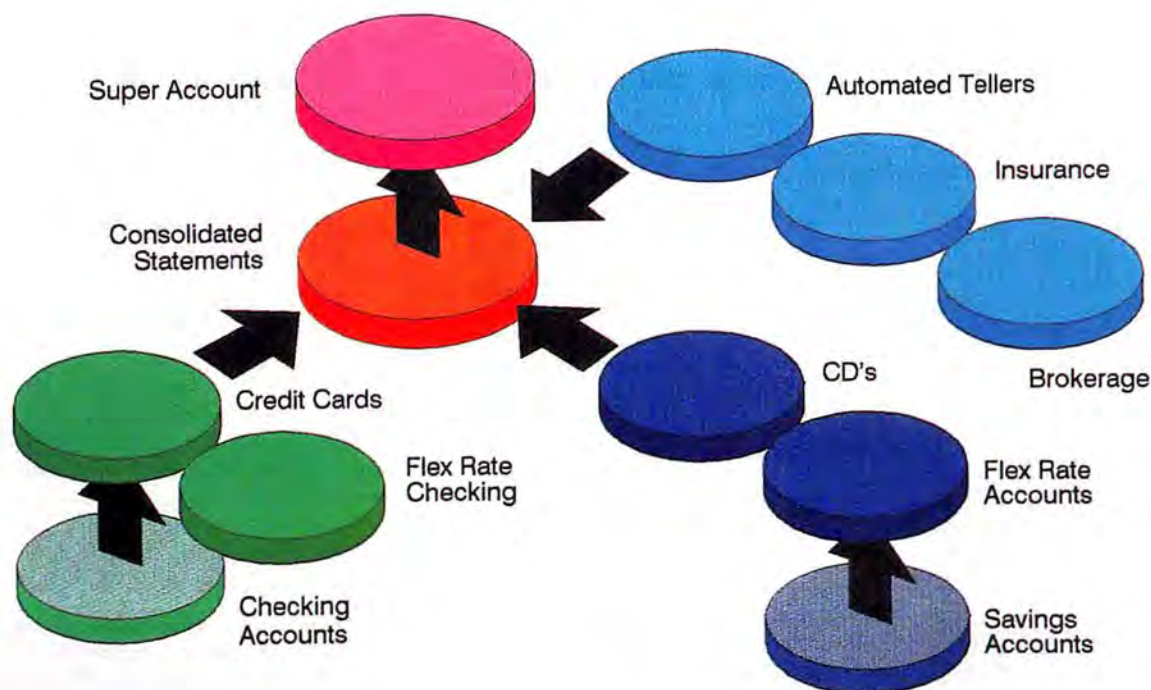
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Because even with two full pages, we couldn't show it all.



The New Lotus Freelance Plus 3.0

PRODUCT OUTLOOK

78 PRODUCT OUTLOOK

PC LightCard

Give older workstations new life with SunRiver's fiber optic multiuser system that lets PCs access the processing power of a 386 host.

SpeedStor AT650E, LANStor LAN650E

If 651MB of storage on a single 5¼-inch hard disk sounds appealing, take a look at Storage Dimensions' internal subsystems for AT-class machines and LANs.

OmniPage

Caere's board/software combo turns PC-based scanners into full-page recognition systems that can handle multiple mixes of fonts, graphics, and formats.

The Complete Communicator

Offices with only one phone line can move into the communications age with a single add-in board that combines fax, voice mail, and a 2400-bps Hayes-compatible modem.

Pentax SB-A4301 Image Scanner

You no longer have to tend your scanner every page of the way—the Pentax feeds automatically like a photocopier and claims to reduce image distortion dramatically.

Ultra 16, LM-317

A brace of very high resolution monitors—the color Ultra 16 works with a wide selection of adapters, while the monochrome LM-317 lures desktop publishers with side-by-side page viewing.

Per:Form

Creating forms just got easier—*Per:Form* supplies lots of design elements and breezes through tricky jobs like making grids.

86 BRIEFLY NOTED

Venture—The Entrepreneur's Handbook

Hitch your wagon to a business plan with a sophisticated tool that includes more than two dozen performance-analysis templates and a planning module developed by the USC Business School.

Instant Image 5500

Every time your system saves a file, Instant Image prompts your tape backup to save it, too.

NetWare SQL

A companion to *NetWare*, this SQL engine lets LAN users choose their front-end application while retaining access to a central data base.

NetWare SNA Gateway, NetWare 3270 LAN Workstation

Gateway hooks up 97 workstations with a single host and offers numerous ways to make the connections; *Workstation* provides the necessary terminal emulation.

@WSLink, Look & Link

Two 1-2-3 add-ins ease the strain on your computer's memory by breaking one worksheet into several and dynamically linking their cells.

90 UPDATE

IBM Token-Ring Network 16/4 Adapter, 16/4 Adapter/A, Token-Ring Network Bridge Program 2.1

Whether you're riding an AT or MCA bus, IBM's Token-Ring just got four times faster.

Crosstalk XVI 3.7, Crosstalk Mk.4 1.1

XVI can now operate in the background, and *Mk.4* has acquired CASL and works with additional drivers, terminals, and protocols.

Mirror III

A scripting language called PRISM and faster file transfer enhance this *Crosstalk* clone.

Disk Technician Advanced

Optimize hard disk performance, diagnose and doctor one or two hard disks, and recover the FAT when your system crashes.

Complete Statistical System 2.1

Four new statistical modules, a proprietary integrated programming language, and a presentation-quality graphics system round out this upgrade.

PC LightCard

Light Speed

Many products can put the zip of the 80386 chip in your tired old PC. Now comes a product that will put 386 zip in multiple PCs. PC LightCard from SunRiver is designed to let a number of older workstations access the processing power of an 80386 multiuser host at "the speed of light."

PC LightCard's fiber optic technology lets a host 386 share information with and display bit-mapped graphics on a work group's pre-386 PCs. The remote workstations are linked to the host via full-duplex fiber optic cables in a star configuration, allowing a direct run of up to 1000 feet to each remote. The system transfers data at a meteoric 32 Mbps—far outstripping the maximum 10 Mbps of an ether-

net network—and connections are virtually immune from electrical interference or cross talk.

SunRiver is positioning PC LightCard as a low-cost alternative to local area networks, although the system also works in conjunction with a net to access other departmental systems or a mainframe. All users on a SunRiver system share the 386's high-performance features, such as 32-bit memory, a powerful CPU, math coprocessors, and a fast hard disk. And unlike most small multiuser systems, PC LightCard doesn't limit remotes to text-only display.

When workstations don't require host processing, they can be hot-keyed back into the stand-alone mode, essentially giving each machine a dual personality. Users can use the disk-based programs they know and



For work groups that pass around 500K CAD files or tap into multi-megabyte data bases, SpeedStor will store 651MB of formatted data on one 16ms 5¼-inch hard disk. LANStor offers the same capacity for LANs.

love yet tap into the speed and power of programs on the host.

In addition to DOS on the workstations, you'll need a multiuser control program on the 386 system, such as Virtual Systems' *Quick Connect*, which loads on top of DOS. Other options are PC-MOS/386 by Software Link, Concurrent DOS 386/Multiuser Graphics Edition from Digital Research, *VM/386* by IGC, and various UNIX derivatives.

A full-size board, PC LightCard fits into any available 8- or 8/16-bit slot on the remote workstation. All processing is performed by the host, which is outfitted with a SunRiver Fiber Optic Host Adapter in a 16-bit slot. Each adapter draws very low wattage from the host machine and supports up to 4 remotes. SunRiver recommends 4 to 6 remotes for memory-intensive applications such as computer-aided design and as many as 12 for of-

fice applications such as word processing and spreadsheets.

The retail price of a single PC LightCard is \$899; each adapter is \$799. Ready-to-install cable, available from SunRiver in lengths of up to 1000 feet, starts at \$110 for 25 feet. Hardware on the adapter supports remote monitors, including Hercules-compatible monochrome, EGA, enhanced EGA, VGA, and enhanced VGA. SunRiver Corp., 108 Business Park Dr., Jackson, MS 39213; 601/957-0100, fax 601/957-3253. —Glenn Grant
Reader service no. 650

SpeedStor AT6-50E, LANStor LAN650E

Wide-Open Space

PC processing power long ago reached the point where it could provide inexpensive microcomputer



PC LightCard lets your work group's older workstations access the processing power of an 80386 multiuser host at the speed offered by fiber-optic cable. It even displays bit-mapped graphics.

solutions to minicomputer-size problems. But PCs still lag behind minis in storage capacity. If your work group passes around 500K CAD files or taps into multimegabyte transaction-oriented data bases, you may already have faced a difficult choice between an expensive proprietary mini or a PC with a not-so-efficient chain of hard drives.

Storage Dimensions offers another option: two internal PC hard disk subsystems, either of which gives you 651MB of formatted data storage on a single 5¼-inch hard drive. That's almost twice the capacity of most manufacturers' internal 5¼-inch drives, and it's all available in a single volume for that really massive data base.

The SpeedStor AT650E (for IBM ATs and compatibles) and the LANStor LAN650E (for ATs on local area networks) each works its magic through an ESDI controller, which replaces your current hard disk controller and plugs into any 16-bit slot on the AT bus. SpeedStor, which runs under DOS or Xenix, lists for \$7395.

LANStor, designed for Novell NetWare file servers, is only \$100 more. Each drive mounts in a standard peripheral bay in your computer.

The drives are tested and formatted for DOS/Xenix or Novell installation prior to shipping and include a disk-diagnostic and -formatting utility that helps you configure the subsystem for your computer's particular set-up. The software breaks the 32MB partition limit of DOS versions earlier than 4.0, allowing anything from 24 partitions to a single 651MB partition. You can even span volumes and have a single 1.3GB partition across two drives. The systems are backward-compatible from DOS 4.0 and work with any well-designed DOS shell.

SpeedStor transfers data three times faster than a standard AT drive and 50 percent faster than the speediest PS/2 drives, regardless of drive size, according to Storage Dimensions. SpeedStor and LANStor achieve an average access time of 16ms and a blazing 15-Mbps

data transfer rate by packing a total of 414.7 kilobits of available user storage under 15 read/write heads. (In contrast, a typical 30MB AT drive has 52.2 kilobits under 6 heads.) Data transfer is especially fast when reading or writing a single large block of data, such as a worksheet.

Many typical throughput-maximizing techniques just can't keep up with these drives. Neither drive includes elevator seeks (which retrieve the closest data first). Nor does either drive include caching, because caching controllers can't keep up with the high data transfer rate.

But then, these drives don't need any help. The only things close to SpeedStor and LANStor in storage capacity are optical disks. But optical drives' sluggish 104ms average access time and typical transfer rate of 200 kilobits per second make them six to ten times slower. Storage Dimensions, 2145 Hamilton Ave., San Jose, CA 95125; 408/879-0300. —Glenn Grant

Reader service no. 651

capture the leading role in data-input dramas.

Caere's OmniPage recognition system is a board/software combo that gives the average PC-based desktop scanner capabilities usually found on far pricier models—principally, the ability to scan a whole page, containing multiple typefaces, at once. Exploiting a muscular coprocessor, OmniPage helps your scanner recognize any font, number of columns, and mix of graphics, regardless of format. So you can scan not only mailing lists and typed documents but résumés, forms, magazine articles, and spreadsheet data.

Once it is scanned and recognized, the material is in ASCII format and can be converted to any of 18 word processing formats as well as data base, spreadsheet, and desktop publishing file formats. OmniPage adds even more horsepower to text-scanning applications by including a free copy of *Dragnet* software for non-indexed text retrieval.

OmniPage for the PC bundles in a run-time version of *Microsoft Windows* and an add-in board packed with a Motorola 68020 coprocessor and 2MB of memory. The powerful coprocessor lets page recognition proceed in the background while you scan more pages or go about other business.

Thanks to a heavy complement of on-board memory and special multitasking software, OmniPage handles files up to 1.4MB—the size of a scanned legal-size document—without requiring expanded or extended memory. The board fits in an



Caere's OmniPage board/software recognition system lets your PC-based desktop scanner capture a whole page at once—including multiple fonts, formats, and graphics.

OmniPage

No Bit Player

Inexpensive desktop scanners have generally been consigned to supporting roles in graphics because of their limited ability to recognize different typefaces and columnar formats. But once they're outfitted with Caere Corporation's add-on, OmniPage, they'll be able to

OUR NEW PRINTERS MAKE EVEN BAD WRITING LOOK GOOD.

CHAPTER ONE
THE BLACKEST HOUR IS MIDNIGHT

It was not a night fit for man or beast what with the sky being as black as ink and it starting to rain like cats and dogs. As if things weren't bad enough Jeffrey Whipple had to climb all the way up to the top of Bald Eagle hill in his snakeskin boots so new their smell reminded him of a car he once leased in Flagstaff, Arizona just to check things out because earlier in the day a message had gotten through that there was going to be trouble this night so he was feeling ominous as the dry wind whipped up the dust around his feet and wondering if he should go on or go back to camp when suddenly, he heard a twig crack behind him or thought he did but as he turned he ...

We're sorry that our new 24-wire Pinwriter® P5200 and P5300 printers can't do much for the quality of your writing. But they can certainly do wonders for the way it looks. The secret is the ribbon. Other dot matrix printers only use a fabric ribbon. Our Pinwriters print with both a fabric and a letter-quality, multi-strike film ribbon—the same kind used on executive typewriters.

The NEC Pinwriters can also enhance your writing in other ways. They have seven resident type styles. Plus four more are available on plug-in font cards. Which means you can express your thoughts with just the right typeface. You can also get an inexpensive, user-installed color option. And if graphics are part of your story, these Pinwriters produce the highest resolution of any printer you can buy.

Call NEC Information Systems at 1-800-343-4418 to see how much better our new Pinwriter P5200 and the wider P5300 can make your writing look.

Whether you're a budding Hemingway, or a Hemingway & Company.

**NEC PRINTERS. THEY ONLY STOP
WHEN YOU WANT THEM TO.**



NEC

NEC Information Systems, Dept. 1610, 1414 Massachusetts Ave., Boxborough, MA 01719.

8-bit slot and runs on any Windows-capable PC.

OmniPage comes with drivers for Hewlett-Packard's ScanJet and the Canon IX-12 scanners and is compatible with desktop scanners that produce TIFF files. OmniPage for DOS systems retails for \$2495. You get your free copy of *Dragnet* by showing a registration card. Caere Corp., 100 Cooper Ct., Los Gatos, CA 95030; 800/535-7226. —Mark Henricks
Reader service no. 652

The Complete Communicator

Voice, Fax, and Modem in One

If you regularly send E-mail and fax messages over the phone, but your small business or home office has only one phone line, The Complete Communicator add-in card brings you into the age of high-tech communication. And you don't have to install another phone line. The Complete Communicator combines a 9600-bps group III fax board, a PC-based voice-mail system, and a 2400-bps Hayes-compatible modem on one card that fits in an 8-bit slot.

The board comes with memory-resident fax software that receives, sends, and prints in the background. A flashing light in the lower right corner of your screen alerts you to incoming faxes while you work in another application. You can send faxes from within various graphics and word processing programs by calling up a menu for the

memory-resident software and keying in the name and number of the recipient. Distribution lists help you mass-fax to individuals or groups.

The same phone line and a similar background operation handle voice messages. You can call up the PC-based voice mail system and operate it with voice prompts. The system gives you 999 password-protected mailboxes and will forward messages as well as deliver them at prescheduled times.

The 2400-bps modem comes with Bitcom software for the Hayes AT protocol. A future version of the product will comply with the DCA/Intel Communicating Applications Specification, supporting packages that incorporate CAS communications modules.

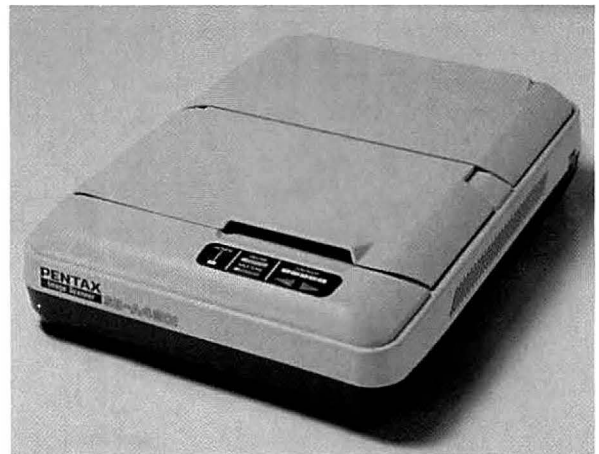
The Complete Communicator, including 9600-bps fax capabilities, a 2400-bps modem, and voice messaging, is priced at \$899. It requires an XT or AT system with 512K of memory and a hard disk. Displaying fax messages on screen requires a CGA, EGA, VGA, or Hercules graphics adapter. The Complete PC, 521 Cottonwood Dr., Milpitas, CA 95035; 408/434-0145. —Mark Henricks

Reader service no. 653

Pentax SB-A4301 Image Scanner

Better Feeding Habits

If you're at all serious about desktop publishing, you're familiar with the scanner drill: Put the



Scan documents at a rate of 10 seconds per page using the optional sheet feeder on Pentax's SB-A4301 Image Scanner.

document in the scanner, wait for the transfer to disk, remove the document, insert a new one, wait for the transfer to disk—it's like raising and lowering the lid on a photocopy machine over and over.

But if your document isn't bound together, you don't have to tolerate that in a copier, and now you don't have to put up with it in a scanner either. Pentax Technologies' SB-A4301 Image Scanner features an optional document feeder that ends the waiting game. With the feeder attached, the flatbed scanner accepts up to 30 originals at a scanning speed of 10 seconds per page, producing output at resolutions of between 39 and 300 dpi.

Pentax claims that its feeder is more accurate and less likely to skew paper than other brands because it doesn't use rollers. Once inserted, each page rests on a glass platen, and the scanner head moves beneath it to capture the image.

Most scanner heads use mirrors and light bars to reflect images to the scanning lens, but each vibrates at a different rate—a potential source of distortion—and it's relatively easy for a mirror or light to get knocked out of alignment. The Pentax head uses a patented folded optical path, which packs all of its mirrors and light sources into a single unit that vibrates at one frequency and significantly reduces image distortion, the manufacturer claims. Naturally, the SB-A4301 also is better suited for scanning books and large documents in single-sheet mode than roller-type scanners.

If you want to reduce or enlarge an image without sacrificing image quality, you'll find the SB-A4301's dithering feature handy. This lets you simulate gray scales on your laser printer and maintain image quality in much the same way newspaper halftones work—by translating a photo's continuous tones into from 39 to 300 dots per inch.



The journey to discovery can sometimes be a long and arduous one.

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And especially when you're not a programmer.

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The Control Center is a logical, intuitive window from which you perform all your key database operations. A constant frame of reference, if you will, for harnessing all of dBASE IV's formidable power.

Through the Control Center, you get simple and understandable access to every one of dBASE IV's modules and functions. Like the powerful Report Writer. The Applications Generator. And much, much more. So that the time it takes to develop your applications can be drastically reduced.

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Want to see for yourself? Just visit your local authorized Ashton-Tate dealer for a demonstration, or call 800-437-4329* ext. 2934 for details on videotapes, demo disks, upgrades, and more.

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**“It’s a whole lot easier
when you can see
what you’re doing.”**



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Princeton Graphics' Ultra 16 monitor combines multiscanning with high graphics resolutions, matching every graphics card standard from MDA to the 1024 by 768 resolution of IBM's 8514/A.

On the other hand, you also can produce high-contrast line art and text by selecting the scanner's black-and-white-only mode. The SB-A4301 comes bundled with Citadel Products' *Synergy Optical Character Recognition* software, which converts bits into the ASCII characters that they represent. As you scan, you "train" the software to recognize various type styles between 10 and 24 points. The resulting text file can be imported into most word processing programs.

Also included in the bundle is *GEM Scan*, a desktop publishing program for integrating scanned images with text. *GEM Scan* provides TIF and .IMG output formats for use with *Ventura Publisher* and *PageMaker*.

The scanner, software, and IBM-compatible interface sell for \$2195. Pentax Technologies Corp., 800 Interlocken Pkwy., Broomfield, CO 80020; 303/460-1600. —Glenn Grant

Reader service no. 654

Ultra 16, LM-317

Pick a Pair

If you work in computer-aided engineering, manufacturing, or design, you want a monitor with high resolution. If you're in desktop publishing, you want to see as much of your page on screen as possible. Princeton Graphics has introduced new monitors that should satisfy both engineering and desktop publishing types, plus anyone who spends long hours in front of the tube.

For the engineer, designer, or architect, there's the Ultra 16, a 16-inch high-resolution color monitor that is compatible with every kind of graphics adapter up to and including IBM's extremely high-resolution (1024 by 768 pixels) 8514/A.

The Ultra 16 features asynchronous horizontal and vertical scanning, which means that you can plug it into virtually any computer with any graphics card and go right to work. That includes classic PCs and IBM PS/2s equipped with MDA, CGA, EGA, VGA, Hercules, MCGA, or PGA graphics. The monitor automatically detects the type of board installed and locks on to its signal. Two types of cables are provided, one for analog systems (MCGA, VGA, PGA, and 8514/A) and one for digital (MDA, Hercules, CGA, and EGA).

In analog mode, the Ultra 16 offers up to 256 colors in VGA mode and 16 colors with an 8514/A, both from a palette of 262,144. These help add dimension and detail to graphic representations.

Autosizing eliminates that annoying black border around the image area, presenting a larger work space regardless of the program in use. A built-in tilt-and-swivel base, small footprint, color switch for text support, and black-matrix nonglare screen are standard. The suggested retail price is \$1375.

The LM-317 is a high-resolution, monochrome, landscape-mounted display ideal for desktop publishing and CAD applications. Basically a 17-inch vertical monitor flipped over on its side, it offers 1664 by 1200 resolution at 140 dpi for a high-precision image. Four gray levels allow you to display photographs and illustrations with maximum intensity and detail.

The LM-317 requires the right controller card, such as Princeton's PG-1600 (\$750), Sigma Design's LaserView Plus (\$995), or the Number Nine Pepper 1600 (\$1495). It allows side-by-side page viewing in programs such as *Microsoft Windows*,

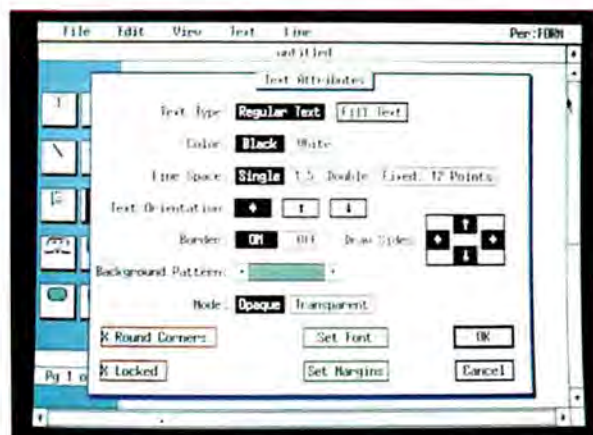
Ventura Publisher, *PageMaker*, *GEM* applications, and *AutoCAD*. Ergonomic details include a built-in tilt-and-swivel base and front-mounted, easy-access user controls. Suggested retail price is \$949. Princeton Graphics Systems, 601 Ewing St., Bldg. A, Princeton, NJ 08540; 800/221-1490, 609/683-1660. —Glenn Grant

Reader service no. 655

Per:Form

Function-Following Forms

In theory, desktop publishing programs are ideal for designing time cards, expense reports, and other business forms. In practice, a forms job like creating grids with variously shaded cells turns out to be a frustrating exercise in repetition. Vertical text, a common forms requirement, may be virtually impossible to achieve.



Build a form in the comfort of Per:Form's graphic user interface, taking advantage of tools that even a desktop publisher can't match.



A funny thing happens when you go around solving other people's database problems.

People tend to think of you as somebody you're not.

But that's all right. Because with all due respect to those who develop applications professionally, the fact is that more and more everyday people are being encouraged to turn out more

and more everyday programs.

Of course, it helps if they have a tool like dBASE IV's Applications Generator.

The dBASE IV™ Applications Generator does pretty much what its name implies: it writes the necessary code to pull together all the elements of your application. So you can concentrate more on what you want to accomplish, and less on what you have to do to get there.

The Applications Generator is fully integrated with dBASE IV's new Control Center, too. So you get a simple, understandable way to access all

this power. Be careful, though—this combination just might turn you into a programmer.

Which actually may not be so strange after all.

Want to see what it feels like? Just visit your local authorized Ashton-Tate dealer for a demonstration, or call 800-437-4329* ext. 2934 for details on videotapes, demo disks, upgrades, and more.

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“It’s kind of strange, really—all of a sudden people think I’m a programmer.”



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Per:Form software from Delrina Technology brings desktop publishing technology to forms processing with wrinkles that make it outperform generalized publishers. For instance, if you've ever used a desktop publishing package to create a grid of minuscule blocks for a time card, you'll appreciate the way *Per:Form* treats such an image as a single object rather than requiring that each tiny square be handled separately.

Per:Form uses the Digital Research *GEM* interface of drop-down menus, icons, and on-screen mouse pointers, so if you happen to use that or *Ventura Publisher*, your learning curve just got a lot flatter. *GEM* also means that Delrina's forms maker supports all major monitors, mice, and printers.

Per:Form comes in two modules. The design module is stocked with lines, rectangles, and rounded rectangles. If you want to dress up your forms, images can be either scanned and traced or imported from clip-art packages. Text typed in can be underlined and presented horizontally or vertically in multiple, downloadable fonts.

The fill module is a what-you-see-is-what-you-get data entry tool that operates independently, allowing form users to tab to fields and input data on their PCs. That means no more forms smeared with illegible scribbles—just clean printing, perfectly lined up. Your calculator may get dusty too, be-

cause *Per:Form* has a math function that automatically adds fields, subtracts a discount, figures sales tax, and fills in totals.

Per:Form is priced at \$259.95 and comes with run-time version of *GEM* and a 60-day guarantee. It requires DOS 2.1 or a later version and 640K of memory; a mouse is strongly recommended. Delrina will sell you a Mitsubishi mouse for \$39.95 with your order. Include proof of purchase of a character-based forms package and you get the mouse for free. Delrina Technology Inc., 4454 Genesee St., Buffalo, NY 14225; 800/268-6082.

—Mark Henricks
Reader service no. 656



Venture—The Entrepreneur's Handbook

Star Software has released *Venture—The Entrepreneur's Handbook*, a business software system designed to help emerging businesses plan for the future, analyze operations, and control their growth.

If you're involved in a business startup or one of the estimated 12 million existing small businesses, *Venture* can guide you through the development of a comprehensive plan to attract funding and act as a blueprint for sales and marketing strategies.



Build a comprehensive business plan with *Venture—The Entrepreneur's Handbook*; it's equipped with common business forms and financial statements, a word processor with mail merge and spell-checking capabilities, a spreadsheet, a file manager, and a double-entry general ledger.

Venture's interactive business planning module—developed by faculty at the University of Southern California Business School—steps you through the planning process with contextual prompts and helpful on-screen hints. The package includes common business forms and financial statements. More than two dozen templates allow you to analyze financial performance on an ongoing basis.

Additionally, the package integrates a word processor with mail merge, a spelling checker, a spreadsheet, a file manager, and a double-entry general ledger. Star also sells the low-priced *Accounting Partner Series* for other basic accounting functions such as accounts receivable and payable.

Venture employs Tandy's *DeskMate* environment for a consistent graphic interface complete with pulldown menus and mouse support in all modules. The *Desk-*

Mate clipboard facilitates the transfer of data across modules, and *Venture* imports and exports 1-2-3 and ASCII files.

Venture sells for \$349 with 30 days of free support. An additional year of support costs \$250. The software requires DOS 3.0 or a later version, 512K of memory, and a hard drive. Star Software Systems, 363 Van Ness Way, Torrance, CA 90501-1420; 800/242-7827.
Reader service no. 657

Instant Image 5500

The Instant Image 5500 add-on board converts tape backup systems to automatic, nonstop operation. Consolink Corporation's user-installable board, software, and cables eliminate tedious manual backups by automatically capturing data on tape as it is saved to your main storage device. Alternatively, you can set the software to back up at given intervals.



It's always the raw speed of an application that seems to catch one's attention. But when you think about it, speed alone doesn't always determine the amount of useful work you can produce.

That's why in dBASE IV™ we added more than just a blazingly fast .EXE compiler. We added a total of 310 new or enhanced commands and

functions that help you complete your applications in less time than you ever thought possible.

And without your having to become a full-fledged programmer to do it.

Of course, the compiler by itself lets you run applications significantly faster than is possible with dBASE III PLUS™. But you'll also find yourself working much more efficiently through dBASE IV's intuitive new Control Center. As well as by using its Applications Generator. Or the Report Writer. The Forms Generator. And much more.

After all, when it comes to developing dBASE IV applications more quickly, there's not just one way to do it.

There is one way to find out more, though. Just visit your local authorized Ashton-Tate dealer for a demonstration, or call 800-437-4329* ext. 2934 for details on videotapes, demo disks, upgrades, and more.

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“Have you noticed that program speed is not the only reason you get things done faster?”



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Circle 19 on reader service card

	1986	1987	1988
Sources of working capital:			
Net income	\$276,977	\$682,094	\$790,486
Non-cash charges to income:			
Deferred income taxes	\$32,872	(\$37,566)	
Depreciation and amortization	\$79,832	\$96,267	\$185,246
Working capital from operations			
Sale of fixed assets			
Issuance of common stock			
Issuance of preferred stock			
Total sources	379	740	976
Uses of working capital:			
Additions to fixed assets	129		
Additions to other assets	131		
Dividends paid on capital	170		
Total uses	430		
Statement of Income 1988			
Income from operations		\$1,193,975	
Interest and dividends		\$76,433	
Income before income taxes		\$1,270,408	
Provision for income taxes		\$472,880	
Net income		\$797,528	
Earnings per share		\$1.11	

Struggle with gargantuan worksheets no more! Look & Link lets you store huge spreadsheets in manageable pieces and consolidate them later using its pop-up window.

Continuous automatic tape backup, as Consolink calls the technology, miniaturizes a convenience that's familiar to mainframe computer users. The Instant Image 5500 relies on a 5K memory-resident program to detect each time your system writes to disk and then route a copy of the information to a 128K RAM disk on the board. The buffer is dumped to tape only when full so that your system won't bog down with constant writing to tape. You also can order saves at intervals of 1 to 10 minutes.

Instant Image versions are offered for tape drives made by Emerald Systems, Everex, Genoa, and Maynard; subtle differences in the pin-out configurations require special cables for each manufacturer's drives.

Consolink prices the add-in at \$599. Consolink Corp., 1840 Industrial Circle, Longmont, CO 80501; 303/651-2014. **Reader service no. 658**

NetWare SQL

NetWare SQL is an ANSI-compatible Structured Query Language engine optimized for Novell's well-established *NetWare* network system software. Tightly integrated into the system software, *NetWare SQL* offers a framework that lets local area network users select the front-end interface they want—be it a data base, a spreadsheet, or a word processor—while the back-end SQL engine offers quick access to a common data base.

NetWare SQL not only provides the transaction and user-access security protocols of industry-standard SQL but also the standard *NetWare* passwords and privileges. It comes with backup utilities, fault tolerance through *System Fault Tolerance (SFT) NetWare*, and Novell XQL data base facilities for software developers, including multiple language interfaces and support for a wide range of data types.

Borland International and WordTech Systems are among the companies

that have announced plans to support *NetWare SQL*. The software, which sells for \$595 per server, requires DOS 3.1 or a later version and at least 2MB of memory on the server and 512K on the workstations. Novell Inc., 122 E. 1700 S, Provo, UT 84601; 801/379-5900.

Reader service no. 659

NetWare SNA Gateway, NetWare 3270 LAN Workstation

Novell is shipping enhancements to its *NetWare* operating system that support improved gateways between Novell local area networks, wide area networks, and large systems.

NetWare SNA Gateway lets up to 97 workstations on a *NetWare* net communicate with an IBM or compatible host computer via token ring, remote, remote-assist, coax-multiplexer, or coax connectivity options. *NetWare SNA Gateway ELS* is an entry-level version for low-end *NetWare ELS* nets that offers connectivity at a lower price for up to 5 net workstations.

The software comes with a Quick-Start guide, a menu-driven customization program for quick installation, and self-test and diagnostic management tools. Novell claims to have solved many of *NetWare's* performance and connectivity snafus, such as breakdowns under heavy traffic, that have made LAN managers re-

luctant to use SNA gateways in the past.

NetWare SNA Gateway sells for \$2995 for an unlimited server-based license, and *NetWare SNA Gateway ELS* sells for \$595. Both are compatible with *Advanced* and *SFT NetWare* version 2.1 and *ELS NetWare Level II* version 2.1 and run on Token-Ring, Ethernet, and other NetBIOS-compatible nets.

Both offerings require *NetWare 3270 LAN Workstation*, which provides PC terminal emulation and communicates with the mainframe host via a Novell SPX or NetBIOS connection. The 3270 software is bundled with Novell's SFT fault-tolerance network system software and is available with a server-based license for \$995.

NetWare SNA Gateway requires 230K to 370K of memory, while *ELS* requires 232K. Each workstation should have 640K. DOS 3.1 or a later version is required for each workstation and server. Novell Inc., 122 E. 1700 S, Provo, UT 84601; 801/379-5900. **Reader service no. 660**

@WSLink, Look & Link

If your worksheets are straining your system's memory limits, a pair of new 1-2-3 add-ins will help break those memory killers into multiple worksheets that will be easier on both your computer's memory and yours.

Goldata Computer Services' *@WSLink* is the simpler and less expensive of the two. For only 19K of memory and \$49.95, you

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- 101-key keyboard

GV 286* — \$1299.

- 80286, 12MHz
- 512KB, zero wait-state
- 32KB RAM cache
- 2 serial, 1 parallel port
- 1.2MB or 720KB floppy drive
- 101-key keyboard

*PC Magazine's "Editor's Choice" on October 13, 1987. Ranked #1 in PC Week's Poll of Corporate Satisfaction, October 17, 1988.

GV 386/16 PLUS — \$2399.*

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- 1MB, zero wait-state
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- 1.2MB or 720KB floppy drive
- WEITEK & 80387 support
- Up to 16MB of 32 bit memory

*FCC approval pending

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- 1.2MB or 720KB floppy drive
- WEITEK & 80387 support
- Up to 16MB of 32 bit memory

*FCC approval pending

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can link cell values dynamically between multiple worksheets, and the program will automatically update selected cells in an unlimited number of worksheets on a network as well. Goldata Computer Services Inc., 2 Bryn Mawr Ave., Bryn Mawr, PA 19010; 800/432-3267.

Reader service no. 661

At \$99.95, *Look & Link* from Personics Corporation has the same dynamic linking plus more features and the ability to consolidate several worksheets into one. Summing a year's worth of monthly profit-and-loss statements to produce an annual is

just one of the many chores *Look & Link* makes much easier.

Whether you're consolidating or linking, you'll need to know what you're working with. That's where *Look & Link* shines. It gives you a hot key that calls up a second worksheet inside a pop-up window. You can scroll across or up and down, resize the window, and even cut and paste, making child's play of the otherwise tricky task of deciding which cells to link. Personics, 63 Great Rd., Maynard, MA 01754; 508/897-1575.

Reader service no. 662

The new products also boost throughput with an "early token release" technique, which lets a workstation transmit its token immediately after sending a frame of data, rather than waiting for the frame to return. More than one token can operate on the net at a time, achieving operating efficiencies of up to 95 percent, claims IBM.

While the new cards can run at either 4 or 16 Mbps, they cannot do so simultaneously, nor can speeds be mixed on the same Token-Ring. But you can connect Token-Rings of different speeds through a gateway that's equipped with both adapter cards and is running IBM's *Token-Ring Network Bridge Program* version 2.1, which forms multiple physical rings into a single logical ring. The 16/4 Adapter/A permits you to change speeds through software, while the 16/4 Adapter requires the use of switches.

Unlike 4-Mbps Token-Rings, which can operate on unshielded cabling, 16-Mbps nets require more expensive shielded cabling.

Both the 16/4 Adapter and 16/4 Adapter/A retail for \$895. IBM also enhanced and repriced its existing 4-Mbps products; an upgraded 4-Mbps MCA adapter is available for \$750, while an AT-bus version sells for \$650. IBM, U.S. Marketing & Services Group, 900 King St., Rye Brook, NY 10573; 800/426-2468.

Reader service no. 666

Crosstalk XVI 3.7, Crosstalk Mk.4 1.1

Crosstalk Communications has added background communications to *Crosstalk XVI*, letting version 3.7 transfer or download files without interrupting your foreground computing tasks.

Crosstalk Mk.4 version 1.1 gains compatibility with additional terminals, device drivers, and transmission protocols—including IBM NETBIOS, Novell NASI device drivers, and Hayes FAST transmission protocols. It also includes an on-board programming language, CASL, for advanced communications scripting.

Retail prices for *Crosstalk XVI* and *Crosstalk Mk.4* remain \$195 and \$245, respectively. Requirements include DOS 2.0 or a later version, 128K of memory for *Crosstalk XVI*, and 320K for *Crosstalk Mk.4*. Upgrades are available from Crosstalk for nominal fees. Digital Communications Associates, Inc., 1000 Holcomb Woods Pkwy., Roswell, GA 30076; 404/998-3998.

Reader service no. 667

Mirror III

SoftKlone has released *Mirror III*, an update of its *Crosstalk XVI* clone, *Mirror II*. The latest version includes a new scripting language, PRISM (Programmable Integrated Scripts for Mirror), with programming routines that enable you to design custom interfaces, perform arithmetic functions, or parse data

UPDATE

IBM Token-Ring Network 16/4 Adapter, 16/4 Adapter/A, Token-Ring Network Bridge Program 2.1

IBM has introduced a new version of its Token-Ring Network, with adapters and software that enable the net to run at 4 or 16 Mbps, up to four times as fast as IBM's existing Token-Ring offerings.

The 16/4 Adapter for AT-bus machines and its Micro Channel version, the 16/4 Adapter/A, are built around a CMOS chip

that integrates functions formerly performed by six chips in a half-card package. The adapters have 64K of memory on board, compared with a maximum of 16K for earlier LAN models, boosting performance through larger data frames and handling more concurrent sessions on a server. The adapters support frames of up to 18K on 16-Mbps rings and up to 4.5K on 4-Mbps rings, compared with the previous limit of 2K. You can send larger files faster between workstations, facilitating transfers across wide area nets and to mainframes and minis.

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9/12/88	25.12	45.12	74.12	44.37	48.50	18.25	83.87
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63K 13:38

Crosstalk XVI—clone Mirror III includes a scripting language with programming routines that enable you to design custom interfaces, perform arithmetic functions, or parse data from remote sites.

from remote sites. When combined with *Mirror III's* background mode, PRISM allows you to retrieve data in the background and pass it directly to a foreground application by hot-keying between the two.

Mirror III also ships with ACT Software's *CommPressor* data compression and error detection/correction software, which increases file transfer speed up to 2.5 times and saves transmission costs when both PCs are running *Mirror III* or *ACT Mirror III* also gains certain DOS file functions such as COPY and RENAME, a dialing directory, and additional protocol support. It sells for \$99.95 and requires DOS 2.0 or a later version and 512K of memory. SoftKlone, 327 Office Plaza Dr. #100, Tallahassee, FL 32301; 904/878-8564.

Reader service no. 668

Disk Technician Advanced

Prime Solutions offers a new version of its disk maintenance software

with approximately 40 enhanced features. *Disk Technician Advanced* optimizes hard disk performance through a variety of techniques, including finding the optimum setting for a hard drive's interleave and performing a low-level reformat without destroying existing files or drive partitions.

Disk Technician Advanced, which supports two physical hard drives and runs from one of those drives or a floppy, also provides automatic system, data, and file allocation table (FAT) recovery for systems that have crashed.

The program is equipped with artificial intelligence-based pattern recognition that looks for telltale hard drive problems, while its expert system determines appropriate testing and repair routines. A data base stores test results even for intermittent, single-bit errors, providing the system with all the data that it needs for diagnosis.

Disk Technician Advanced applies its propri-

etary testing algorithms to every location on the drive, occupied or not, removing and temporarily storing in RAM data from tracks being tested. If an error is found, the track is reformatted and retested and the data redeposited. Areas that can't be repaired are mapped out, and the data is repositioned in a safe location. The package will not address disk partitions larger than 32MB.

Disk Technician Advanced features an improved version of Prime's RAM-resident *SafePark* head-parking program. It retails for \$189.95 and requires 512K of memory and DOS 2.1 or a later version. Registered owners of *Disk Technician* and *Disk Technician +* can upgrade for \$69.95. Prime Solutions, Inc., 1940 Garnet Ave., San Diego, CA 92109; 619/274-5000.

Reader service no. 669

Complete Statistical System 2.1

Version 2.1 of StatSoft's *CSS (Complete Statistical System)* includes four new statistical modules and numerous enhancements to current modules. The quality-control-analysis module offers flexible implementations of a wide variety of statistical charts, including Pareto and regression-control types. The canonical-correlation module analyzes canonical designs of up to 100 variables. The survival- and failure-time-analysis module employs comprehensive techniques for analyzing social and medi-

cal research data. Finally, a function called distribution fitting automatically computes incremental fit when model parameters are added or deleted.

The package includes its own integrated programming language, CSS:Pascal, which supports recursive function calls, multiple-loop counters, and specialized statistical functions. CSS: Pascal comes with an integrated editing/debugging environment and lets you perform statistical data transformations for uses such as Monte Carlo simulations and data base management.

CSS includes a built-in presentation-quality graphics system, CSS: Intergraph, that is fully integrated with all modules. Creating a graph from your statistics is as easy as pointing to the numbers to be included on the screen and choosing the graph type. For example, select a correlation coefficient and its scatterplot will appear. You can customize the colors on the screen for each module.

The price of CSS remains \$495. Owners of current versions can upgrade for \$90. StatSoft, Inc., 2325 E. 13th St., Tulsa, OK 74104; 918/583-4149.

Reader service no. 671

Glenn Grant is a freelancer based in San Diego, and Mark Henricks is a PC World contributing editor.

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Is dBASE IV Worth the Wait?

dBASE IV fulfills enough promises to keep a horde of dBASE clones off balance.

But some users may balk at its halfhearted SQL implementation and mediocre performance.

The long-awaited *dBASE IV* may be a catch-up product in the rapidly evolving world of programmable data managers, but it doesn't feel that way. With a few exceptions, the additions are thoughtfully implemented and smoothly integrated, putting the program slightly ahead of such rivals as *Paradox* and *R:base*. Yet *dBASE IV*'s reign may be fleeting. Although light-years ahead of *dBASE III Plus*, it fails to deliver a knockout punch, and competitors are busy preparing advanced versions of their products.

Still, Ashton-Tate has given dBASE programmers what they asked for: the best application programming environment on the market. A new pseudocompiler, a menu-driven application generator that beats *R:base*'s Application Express system, a text editor and animated debugger, and additions to the dBASE command language should help stem the exodus to *Clipper*, *Quicksilver*, and *Foxbase +*. Most nonprogrammers will be pleased also. Although a bit of a stretch for

novices, the menu-driven Control Center offers access to almost every facet of the program, including excellent new reporting and forms-creation modules and a welcome new query-by-example (QBE) capability.

As National Software Testing Laboratories (NSTL) benchmarks reveal, however, *dBASE* is still no speed demon. Although *dBASE IV* is two to three times faster than *dBASE III Plus* at nonreporting tasks, *Foxbase + 2.1* is 15 to 25 percent faster at straight indexing and updating jobs than *IV* and 37 to 42 percent faster at updating with an index. When it comes to reporting, *dBASE IV* is positively ponderous—vastly slower than *Foxbase +* and about three times pokier than *III Plus*.

dBASE IV's implementation of Structured Query Language (SQL) is also disappointing. Designed for querying mini and mainframe data bases, SQL was tacked on to *dBASE IV* to please Fortune 500 and government customers. The rough edges show. Performance suffers due to internal translations from SQL to dBASE equivalents and the pairing of .DBF files with special SQL catalog files.

**William
Urschel**

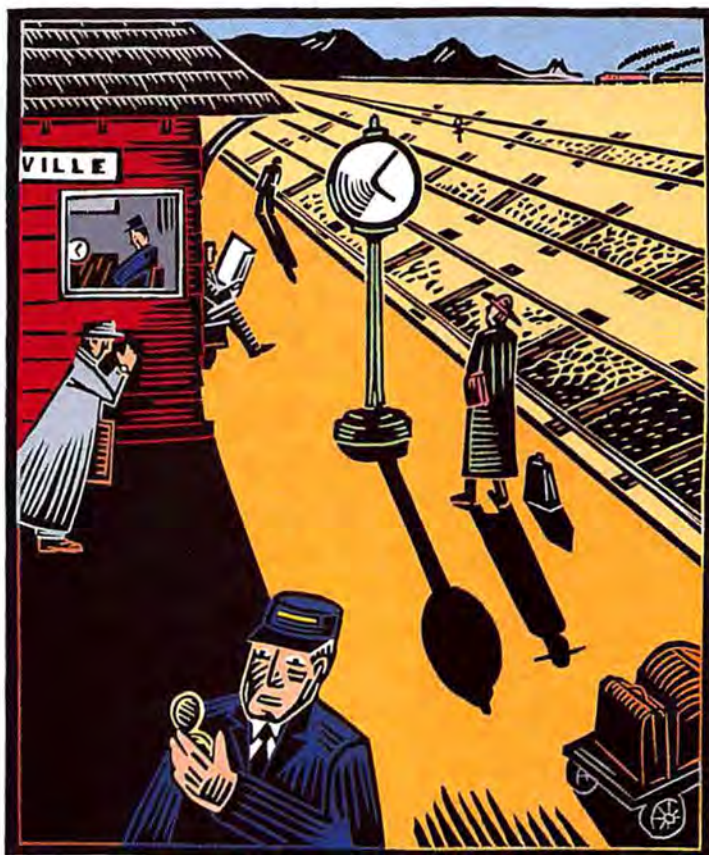
Fortunately, Ashton-Tate and Microsoft will soon jointly release *SQL Server*, a new dBASE engine with true relational talents. The \$2495 package will act as a LAN-based processor that works with a SQL front end built into version 1.1 of *dBASE IV*. Both products are due in mid-1989, and the 1.1 upgrade will be free.

The Price and the Power

If *dBASE IV* sounds good, dig deep into your wallet. You won't have to convert *dBASE III Plus* files and programs, but you will need more RAM (640K versus 384K) and about 3.5MB of disk space. The price has jumped \$100 to \$795, and the upgrade costs a hefty \$175—\$30 if you bought *dBASE III Plus* after February 17, 1988.

dBASE IV is remarkably light on bugs—a welcome change from previous *dBASE* debuts. One serious glitch is the new help system, which sometimes gobbles up memory and freezes the system. Once repaired, this task-oriented, context-sensitive helpmate should be a winner.

More crucial to *dBASE IV*'s success is the Control Center, an integrated menu system that not only guides you through data entry (the old Assistant's major claim to fame) but offers quick access to all major functions. Instead of a point-and-shoot 1-2-3-like menu system, the screen displays the six categories representing the "objects" that make up any data base—data, queries, forms, reports, labels, and applications. When you open a data base, the Control Center displays a catalog of all associated files, which you can access immediately. To modify a label or run a report, for example, simply select the appropriate object, and up pops a menu. If you're familiar with *dBASE*—you don't mind memorizing a passel of keystroke combinations—you can quickly create and



link all the elements of an application. Novices, however, will probably long for a traditional menu structure.

QBE the dBASE Way

Another feature that puts *dBASE IV*'s power in the hands of the average user is its QBE mode, a technique popularized by *Paradox*. Instead of typing a string of convoluted commands at a dot prompt to sift data, you simply fill out a table with the necessary fields and operators. You can use QBE to draw fields from as many as eight files for a single form or report. An update query lets you add, delete, or modify data, but in only one file at a time.

FEATURES EVALUATION

dBASE IV Pulls Even With the Competition

dBASE IV shows dramatic improvement over dBASE III Plus, especially in reporting and application development.

	Paradox 2.0	dBASE IV 1.0	dBASE III Plus	R:base for DOS 2.11	Forbase+ 2.10
<p>● Yes ○ No ◐ Deficient △ Limited only by available disk space</p>					
Data entry and validation					
Command and menu driven	●	●	●	●	●
Forms per file	15	△	△	△	△
Lines per form	330	32,000	250	115	△
Validates via lookup table	●	●	◐ ¹	●	◐ ¹
Range checking	●	●	●	●	●
Checks duplicate index keys	●	●	○	●	◐ ¹
Time checking	◐ ¹	●	○	●	◐ ¹
Development tools					
Application generator	●	●	●	●	●
User-defined functions	●	● ²	○	○	●
Macros	●	●	○	●	●
Animated debugger	●	●	○	○	○
Built-in compiler	○	● ³	○	○	●
File handling and searching					
One-to-many relationships	○	●	○	●	●
Many-to-one relationships	●	●	○	●	●
Many-to-many relationships	○	○	○	●	●
Updates multiple files from one form	○	◐ ¹	◐ ¹	●	●
Self joins	●	●	○	●	○
SQL queries	○	●	○	●	○
Rollback command	n/a	●	n/a	○	n/a
Queries by example or form	●	●	○	●	●
Reporting					
Multifile reports	○	●	○	●	●
Saves report source code	n/a	●	○	○	●
Headers allowed	●	●	○	●	●
Footers allowed	●	●	○	●	○
Summary reports	●	●	○	●	●
Mailing labels	●	● ⁴	●	● ⁵	●

	Paradox 2.0	dBASE IV 1.0	dBASE III Plus	R:base for DOS 2.11	Forbase+ 2.10
Capacity					
File size (in records)	2 billion	1 billion ⁶	1 billion ⁶	2 billion	1 billion
Fields per record	255	255	128	800	128
Characters per record	4000	4000	4000	4096	4096
Tables per data base	△	△ ⁷	△	80	△
Indexes per file	255	47	7	80	7
Fields per index	255	100	100	800 ⁸	37 ⁹
Tables per join	△	8	8	5	10
Maximum number of open data files	△	10	10	80	10
Maximum number of memory variables	△	15,000	256	△	3600
Two-dimensional arrays	○	●	○	○	●
Reads/writes DIF	●	●	●	●	○
EMS support	●	○	○	○	●
Data encryption	●	●	● ¹⁰	○	○

¹ Only via a command file.
² Cannot include macros and approximately 47 dBASE commands.
³ Saves format as object file only, not as source code.
⁴ Lacks postal presorting and merge/purge.
⁵ Via a supplied R:base program.
⁶ Or 2 billion bytes.
⁷ Via command prompt (the Control Center allows only 200 files per file type).
⁸ Fields are individually tagged as key fields; every field can be a key field.
⁹ Variable, based on field lengths.
¹⁰ In multiuser mode only.

dBASE IV's QBE roughly matches the power of Paradox 2.0's and in some ways is easier to use. For example, to link two tables in dBASE IV, simply select them from a menu, and dBASE provides the linking example. Unlike Paradox, dBASE IV saves disk space by storing queries as small pro-

grams that can rebuild a view on the fly. However, Paradox will find the fastest way to do the query; with dBASE IV, the order in which you present a multitable query may greatly affect search speed.

Friendly Forms and Reports

Kiss the @Say command good-bye. With *dBASE IV*, you can create custom data entry forms and reports from within the Control Center without ever resorting to command language. Yet unlike with *Paradox* and *R:base*, source code is generated for all forms and reports and can be included and modified for *dBASE* programs.

To create a custom form, you select fields from menus and arrange them on screen. You can draw lines and boxes, control screen color, and specify error messages and lookup and range verifications. You can search, append, or replace memo fields and display them in a separate window.

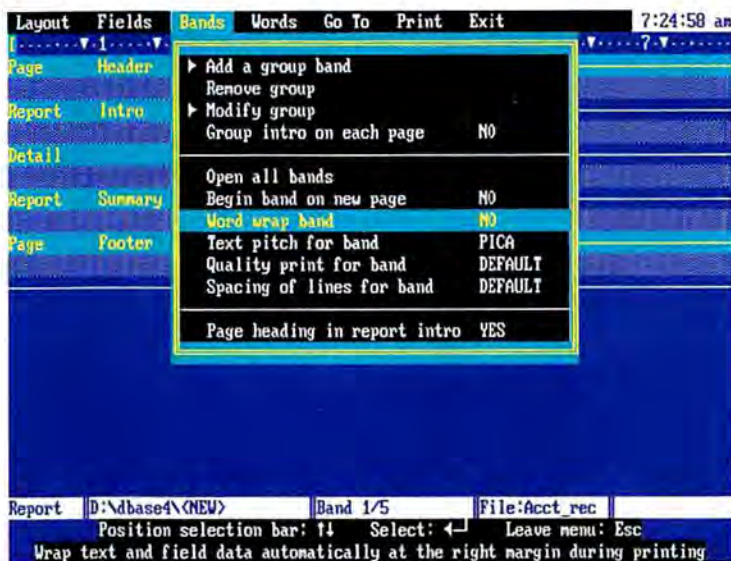
If you can live with its foot-dragging pace, you'll find *dBASE IV*'s report writer equal to any in the business. Like *Paradox*, *dBASE IV* adopts the *band* concept, in which horizontal rectangles on the page control the format of related report elements. And thanks to an improved set of printer drivers borrowed from *Framework*, you enjoy extensive control over fonts, attributes, lines, and boxes. The program also includes four canned formats that produce tabular reports, record-by-record forms, data files, and mail merge reports. They're all customizable, and a handy Quick Layout option pours data into the proper bands automatically.

Programmer's Delight

dBASE IV's collection of built-in programming aids and tools can't be beat. The language includes 240 new commands and functions, most notably, math and financial functions, expanded date and currency formats, two-dimensional arrays, and a floating-point data type that eliminates most rounding errors. The new user-defined functions are welcome but limited, prohibiting macros and about 100 *dBASE* commands.

dBASE IV's text editor shows numerous improvements. It's fast and includes block move, word wrap, and search-and-replace functions. Lines can be 1024 characters long, and file size is now limited only by disk space.

More important, the Applications Generator (ApGen) is finally complete. Although ApGen doesn't paint the footprints on the dance floor like *R:base*'s Application Ex-



press, it's more powerful. As with Express, you can use menus to generate elements such as interrelated data bases, screens, reports, and programs, but ApGen also lets you link elements together into a running application. In addition, you can add custom sign-on screens, define colors and windows, create custom help systems, and take your pick of menu types. If all you need is a quick single-menu program that edits a file or prints a label or report format, an easy Quick Application option spits out what you need in seconds.

Another big boost is an animated debugger that takes its cue from Microsoft's Codeview. As an application runs, the debugger highlights each line of source code as it executes. You can set breakpoints that control execution, monitor the value of variables and fields, and automatically flip a program into the debugger when a run-time error occurs.

Another welcome improvement is a *For-base*-like pseudocompiler that tosses off speedy binary object files. Unfortunately, it runs only when *dBASE IV* is loaded. If you want the real McCoy, you'll have to wait for an upcoming .EXE compiler that should be available as an upgrade to the new *dBASE IV Developer's Edition*. This \$1295 package also includes a royalty-free run-time module, a template language, multiuser testing tools, a linker, drivers, and *dBASE IV*. An extra \$89.95 buys *StepIVward*, a utility that con-

dBASE IV's menu-driven report generator may be the best in the business. As with *Paradox*, reports are separated into different bands for easier creation.

NSTL TEST REPORT

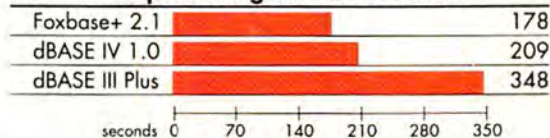
dBASE IV Speeds Up, but Still Lags Behind

dBASE IV is over twice as fast as dBASE III Plus at most tasks, but falls behind at reporting—and Foxbase still soars ahead.

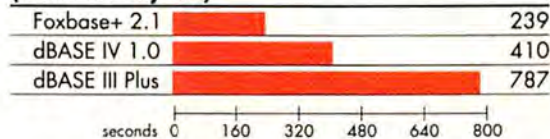
Index four files



Transaction processing without an index



Transaction processing with an index (small history file)



All tests were conducted using a 20-MHz Compaq 386 with 1MB of RAM, a disk cache of 256K, and a 130MB ESDI hard disk.

NSTL used a modified version of TP1, a standard developed out of a real-world situation in which a retail bank wanted to create a system with 10 million accounts, 10,000 tellers, and 1000 branches. The standard unit of transaction selected was debit/credit.

Index four files

This benchmark measured the time required to index four files: Account (50,000 records), Teller (1000 records), Branch (100 records), and Transact (1000 records).

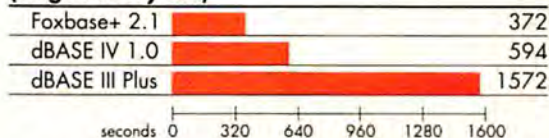
Transaction processing without an index

The TP1 benchmark was run with 1000 transactions. The history file was not indexed for this benchmark.

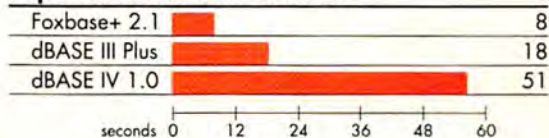
Transaction processing with an index (small history file)

The TP1 benchmark was run with 1000 transactions. The history file held 1000 records before the test was run and therefore ended up with 2000 records. The difference between this and the previous benchmark is that this benchmark used a history file indexed on four fields. Therefore an update of the index was required for each appended record. Compare these results to

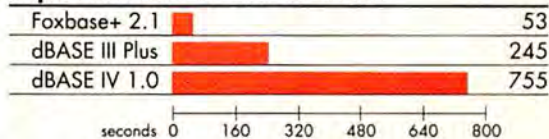
Transaction processing with an index (large history file)



Report selection with an index



Report selection without an index



the previous benchmark's to gauge the effect of updating the index during transaction processing.

Transaction processing with an index (large history file)

The history file from the previous test was expanded from 2000 to 10,000 records, and then the TP1 benchmark was run with 1000 transactions. The history file therefore ended up with 11,000 records. Updating of the index during transaction processing took longer. Compare these results to the previous two benchmarks' to gauge the difference between updating a small index file during transaction processing and updating a large index file during transaction processing.

Report selection with an index

This benchmark reported 1000 records from the account file in index order. Selection criteria were based on an index.

Report selection without an index

This benchmark repeated the previous report-selection test with selection criteria not based on an index.

Data based on tests designed and conducted by National Software Testing Laboratories (NSTL). All rights reserved.

verts Clipper, Foxbase+, and Quicksilver applications to dBASE IV.

Still Waiting for SQL

With the SQL race in full swing, Ashton-Tate had little choice but to offer its own version, based on IBM's DB2. Unfortunately, dBASE IV's SQL implementation is rather crude. You can't send SQL queries from the Control Center, you can't use QBE, and mod-

ifying some data structures is impossible. More important, execution is sluggish.

Getting at SQL's power takes some doing. For example, you have to choose between using pure dBASE, which allows you to get at most SQL tables, or dBASE/SQL, which strips out 80 dBASE commands and adds 100 new SQL commands. Either way, execution drags because SQL won't manipulate data

until it references special tables that are linked to source .DBF files. Using SQL in a *dBASE* program isn't any easier: You must save the SQL code in a separate file, compile it, and then link the files or call the SQL code from another *dBASE* program.

For Programmers Only?

All told, *dBASE IV* is a muscular upgrade that matches and sometimes bests the competition. But examine your motives before you buy. If SQL is a must-have, turn to true SQL-based programs such as *Oracle* or *XDB*. And novices are better served with friendlier programmable data managers such as *Paradox* and *R:base*.

Experienced users who do casual programming will find the choice more difficult. *dBASE IV* delivers the goods with a nice mix of flexibility and ease of use, but the price is high, performance is mediocre, and other vendors may soon up the ante. If you need a serious data base programming environment, however, the *dBASE* language is still the answer, and *dBASE IV* offers the best way of taming it. Some *dBASE* clones may be faster, but *dBASE IV* offers the best line of professional programming tools on the market. ●

William Urschel is president of Arc Tangent, a data base-oriented software development company in Santa Barbara, California.

WHERE TO BUY

dBASE IV 1.0

Ashton-Tate
20101 Hamilton Ave.
Torrance, CA
90502-1319
213/329-8000

Requirements: 640K,
DOS 2.0 or later version
(3.0 or later for LAN
Pack)

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List price: \$795; up-
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17, 1988; LAN Pack (five
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EXECUTIVE SUMMARY

dBASE IV

Data base manager

With its excellent new editor, debugger, compiler, and application generator, *dBASE IV* offers the best data base programming environment on the market. Nonprogrammers will also be pleased with the new report and screen generators, but novices may find the new menu system forbidding. Other debits include fairly slow performance and an awkward implementation of SQL.

	POOR	FAIR	GOOD	EXCELLENT
Data entry and validation			●	
Development tools				●
File handling and searching		●		
Reporting			●	
Capacity			●	
Performance		●		
Overall value			●	

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service card.

NSTL BENCHMARK TESTING

The exclusive test facility for *PC World*, **National Software Testing Laboratories (NSTL)**, is an independent organization that specializes in evaluating personal computer hardware and software. A recognized pioneer in state-of-the-art test design, **NSTL** believes that the most useful benchmark tests measure how well products perform when executing typical business tasks. **NSTL** testers follow detailed test plans that simulate normal operating conditions. A controlled testing methodology ensures objective, accurate, and consistent results and gives consumers a sound basis for making purchase decisions. **NSTL** publishes its test results in *Software Digest Ratings Report*® and *PC Digest*.™ Neither publication accepts advertising. **NSTL** is located in Philadelphia, Pennsylvania.

OS/2 Data Bases: First Steps

OS/2 versions of Paradox, R:base, Dataflex, and Informix-SQL vie for top billing as the new environment's leading data manager.

But where's the audience?

Users seem fed up with promises and predictions, yet OS/2's proponents still confidently project great leaps forward in productivity. They say that multitasking will let you complete several jobs in the time it once took to do one, while the *Windows*-like Presentation Manager will make learning new programs a snap. Everyone agrees, though, that until OS/2 applications arrive offering capabilities not available with DOS programs, you might as well stick with DOS.

Some vendors claim the wait is over. Four powerful DOS-based data management tools now boast OS/2 siblings. The OS/2 versions of *Paradox*, *R:base*, *Dataflex*, and *Informix-SQL* offer the same generous features as their DOS forebears—plus the DOS look and feel, since none of them are written for the newly released Presentation Manager—and each supports multitasking and has access to abundant RAM (see “Getting the Feel of OS/2,” *PCW*, April 1988, for a summary of OS/2 specifications and features).

But don't be deceived by this additional functionality. Most of it comes from the power of OS/2, not from the programs them-

selves. None of these four packages has been rewritten to take advantage of *multithreading*, where multiple lines of code execute concurrently within a single application. In theory, multithreading is one of OS/2's strongest features and enables you to run several data base tasks simultaneously—or to split a big job into several concurrent processes—using one application in a single OS/2 session.

Simply put, the only way to execute simultaneous tasks with any of these four programs is to run multiple OS/2 sessions. The OS/2 versions of *Paradox*, *R:base*, *Dataflex*, and *Informix-SQL* are really ports of their DOS multiuser counterparts; each OS/2 session is roughly equivalent to a separate workstation session running on a LAN. Furthermore, these programs employ more or less the same concurrency controls for multitasking as their multiuser forerunners do in a DOS network.

For Developers Only

Is the arrival of these programs a compelling reason to switch to OS/2? Probably not. Their DOS equivalents provide the same functions, and only a handful of power users will find the ability to run some of those

*Hal
Chapel*

functions concurrently worth the upgrade. Those few who can really benefit from running multiple queries or lengthy reports in the background, for example, might want to convert.

Data base developers, though, are the biggest beneficiaries. Being able to test applications (or compile code) in the background while writing code in the foreground is a productivity boon. And because both data and code are completely portable between the OS/2 and DOS versions of all four programs, developers' hard work can do double duty.

For developers and users alike, lots of memory is part of the price of admission to the brave new world of OS/2. With the ceiling on user RAM suddenly raised from 640K to 16MB, developers have much more room for code; thus all four packages have compiled their various disk-based overlay files into a single RAM-based .EXE file. In addition, the programs load all RAM not occupied by program code with as much oft-used data as possible.

The result is that *Paradox*, the hungriest of the programs, requires at least 3MB of RAM; the rest need a minimum of 2MB. The bright side is that running multiple sessions requires only a little more memory. OS/2 implements *code segment sharing*, never loading more than one segment of the same code into RAM no matter how many sessions are using it. Thus, if you run multiple *Paradox* sessions, only one copy of the program actually resides in memory; each session shares the code.

Still, 2MB to 3MB to get in the door—and an effective minimum of 4MB to 5MB with data—is a high price to pay. Given that these programs are nearly identical to their DOS equivalents, users have a right to expect substantial benefits, such as a big boost in performance. Alas, the benchmarks performed by National Software Testing Laboratories (NSTL) show that speed is another sticking point.

Dragging the Workload

To compare the performance of the OS/2 programs with that of their DOS counterparts, NSTL began with three basic bench-



marks: a group-record search, a subtotal, and a two-file join. The lab ran each test as a single session under DOS and then under OS/2. As it turned out, only *R:base* performed the single-session benchmarks consistently faster under OS/2 than with DOS.

This simple comparison, though, doesn't address the advantage most often cited by OS/2 proponents: work throughput. In other words, multitasking several chores concurrently should be faster than performing them one after another.

The problem is, the most likely foreground task under multitasking is data entry—and accurately benchmarking data entry is impossible. Instead, NSTL set up a straightforward comparison by determining how long it takes sequential DOS sessions and multiple, concurrent OS/2 sessions to do the same amount of work.

The upshot is that only the OS/2 versions of *R:base* and *Datafile* out-muscled their DOS predecessors, and then only in the group-record-search benchmark. The remaining concurrent OS/2 sessions took longer—often much longer—to do the same work as the single sessions. This sounds like damning evidence, against either these pro-

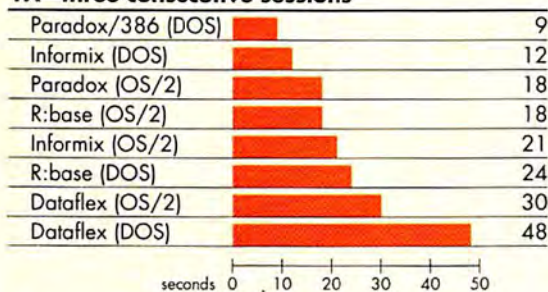
NSTL TEST REPORT

OS/2 Data Managers: Not Built for Speed

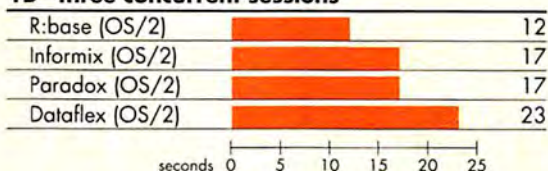
In the data manager melee, R:base for OS/2 comes closest to matching the speed of its DOS version.

Group Record Search on an Index

1A—three consecutive sessions

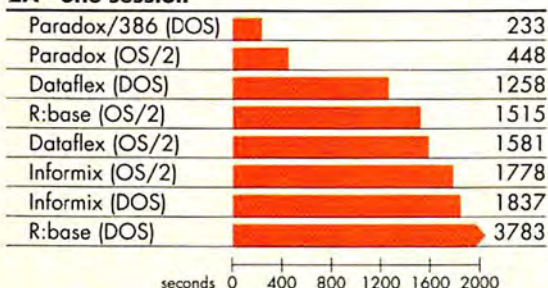


1B—three concurrent sessions

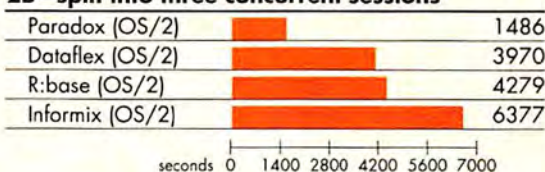


Subtotal of Ten Record Groups

2A—one session

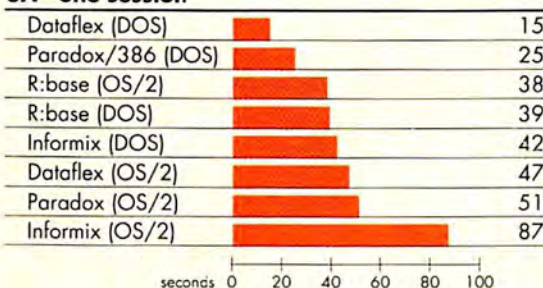


2B—split into three concurrent sessions

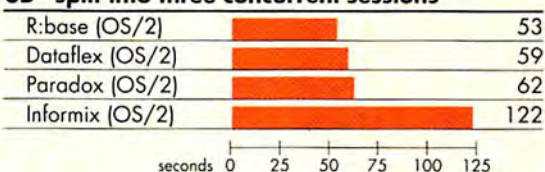


Two-File Join

3A—one session



3B—split into three concurrent sessions



Methodology

The purpose of these tests was twofold: to compare the speed of four OS/2 data managers, and to compare the execution times of the OS/2 programs with those of their DOS versions. First the tests were executed by the programs' DOS versions with caching. The same tests were then executed (using OS/2's disk caching scheme) by the OS/2 versions of these programs in a single OS/2 session.

Next came the multitasking benchmarks. All the multisession OS/2 tests were run in the background using the OS/2 DETACH command to load and start the programs (R:base for OS/2 is incompatible with the DETACH command, so the START command was substituted).

The multisession OS/2 tests were run in the background because OS/2 assigns the foreground task priority. Had one session been in the foreground, the background tasks would have taken much longer, greatly lengthening their overall execution time. In each benchmark recorded here, the tasks had equal priority, and each session ran a task identical to the other sessions' tasks. In all the multitasking tests, each session used a different set of records. Therefore, none of the OS/2 packages' record-locking schemes came into play.

In the first multitasking test (1B), the 1A task was run in three concurrent sessions to see whether performing three times the work simultaneously with the OS/2 versions would take less time than running three consecutive tasks with the DOS versions. To compare how long it takes the DOS and OS/2

versions to search the same number of records, the DOS times listed for 1A represent the result of a single session multiplied by three.

For 2B and 3B, the 2A and 3A tasks were each divided into three parts; each part ran in a separate session, doing a third the work of the single-session benchmark. A comparison of the results indicates how long it took to do the same amount of work in single foreground sessions (2A and 3A) versus three background sessions (2B and 3B).

Each program's native report generator produced the test reports. However, in 1A and 1B, the code produced by *Dataflex's* report generator was not the optimal code and would have given unrealistically slow results. The report generator produces editable code, so a "jump in" statement was included for a fair comparison with the other programs.

All tests were conducted on a Compaq Deskpro 386/20 with 5MB of RAM and an 80387-20 math coprocessor. Compaq OS/2 1.0 was used for the OS/2 tests; Compaq DOS 3.31 was used for the DOS tests. Each test was performed three times for consistency; the times were then averaged.

The OS/2 tests were performed with a 256K disk cache. The PROTECTONLY toggle in the OS/2 CONFIG.SYS file was set to YES, thereby removing the DOS compatibility box. In the DOS tests, the DOS CONFIG.SYS file included the statements FILES=20 and BUFFERS=25. Compaq's disk caching software was used to create a 256K cache in extended memory for all the DOS tests. All benchmarks were timed from the first keystroke of the command sequence until the last line selected was printed.

Group Record Search on an Index

1A—three consecutive sessions

From the center of a 50,000-record file, 100 records were selected on an indexed field using the relational operators <, >, and = to set selection limits. The selected records were sorted in ascending order and printed to a null printer.

1B—three concurrent sessions

From a 50,000-record file, three sets of 100 records were selected on an indexed field using the relational operators <, >, and = to set selection limits. Each session was assigned a different set of records to retrieve. The selected records were sorted in ascending order and printed to a null printer.

Subtotal of Ten Record Groups

2A—one session

From a 50,000-record account file, ten groups of 5000 records were selected. The records were grouped and sorted on the bank branch ID field in ascending order. The account's balance field was subtotaled for each branch or group, and the results were printed to a null printer.

2B—split into three concurrent sessions

From a 50,000-record account file, ten groups of 5000 records were selected. Each session used a discrete account table to process the query and processed a third of the records in 2A. The records were sorted on the branch ID field in ascending order. The account's balance field was subtotaled for each branch or group, and the results were printed to a null printer.

Two-File Join

3A—one session

A 1000-record teller file and a 100-record branch file were joined. The join provided a report of each teller's ID number and name, along with each teller's branch ID number and name. The report was ordered by branch ID number and teller ID number and printed to a null printer.

3B—split into three concurrent sessions

A 1000-record teller file and a 100-record branch file were joined in three sessions. Each session retrieved a third of the records that were selected in 3A. The join provided a report of each teller's ID number and name, along with each teller's branch ID number and name. The report was ordered by branch ID number and teller ID number and printed to a null printer.

Data based on tests designed and conducted by National Software Testing Laboratories (NSTL). All rights reserved.

grams or OS/2 itself, but several important factors deserve consideration.

To begin with, NSTL's benchmarks test just a few of the many functions of a data management system; your own data base operations may yield faster throughput. In addition, because OS/2 gives priority to the foreground task, you wouldn't notice any slowdown if you were entering data in the foreground—and you might not care how long the background task took to finish.

Finally, it's important to note that both the packages and OS/2 are still in their first generation. Future versions will undoubtedly have better-optimized code, and faster throughput will result. This just underscores, however, that it's premature for end users to consider buying the current OS/2 versions of the four programs reviewed.

Old Dogs and New Tricks

The OS/2 versions of *Paradox*, *R:base*, *Dataflex*, and *Informix-SQL* are so similar to their DOS counterparts, it's virtually impossible to tell the difference at the front end. Nonetheless, some internal distinctions bear mentioning. The most significant involve the way multiuser concurrency controls have been adapted to the multitasking environment.

Like their multiuser predecessors, all the programs normally execute the least restrictive lock for the shortest period of time with any given command. Thus, if a command needs to prevent other tasks from updating a record, it shouldn't stop them from reading that record. Unfortunately, these defaults don't always prioritize access in the manner you desire.

If a developer decides to override the defaults and take control of file and record locking, much care and forethought must go into application development. Otherwise, the resulting data contention can yield the same dreaded deadlocks and data spaghetti that haunt multiuser applications. (For more on such problems, see "Share the Wealth!" *PCW*, June 1988.)

Paradox for OS/2

Like the DOS version, *Paradox for OS/2* offers an intuitive query-by-example inter-

EXECUTIVE SUMMARY

Paradox for OS/2

OS/2 data management program

Paradox for OS/2 shares the look and feel of the DOS version, and most concurrency controls ported from the DOS multiuser version shine during multitasking. But it's slower than the DOS version and it lacks a transaction-processing capability.

	POOR	FAIR	GOOD	EXCELLENT
Concurrency controls				●
Multisession initiation				●
Development tools				●
Performance			●	
Overall value				●

face, complete with 1-2-3-like menus and tables. And the Personal Programmer, *Paradox's* application generator, remains an excellent tool for both lay users and experienced developers.

The most important change is in the *Paradox* Application Language (PAL). A single new command, Session, permits PAL developers to write a front end that initiates concurrent processes, each requiring its own *Paradox* session. This demands more memory and processing overhead than true multithreading, and you need to write more code, but the benefit is seamless, menu-driven execution of multiple tasks.

Paradox enjoys the same sophisticated set of data locks offered by the multiuser version, including a "prevent full lock" option that allows maximum concurrent access. If a background task updates a record while you're viewing it, *Paradox* automatically refreshes your screen with the updated information. This auto-refresh exacts a heavy toll on CPU time, but you can enhance performance by setting longer intervals between refreshes.

One of *Paradox's* strengths in a multiuser setting turns out to be a weakness in a multitasking environment. On a LAN, if you request previously locked data, *Paradox* tells

you which user has the lock. Under multitasking, the program identifies which *task* has the lock, giving the requester the option to suspend the task.

This notification scheme works fine if a user running the foreground task has made the request; the user can merely answer yes or no. But if one background task competes with another, the requesting task grinds to a halt—at least until the user cycles the background task around to the foreground and makes a choice. It takes a good developer to avoid this gridlock.

R:base for OS/2

R:base for OS/2 profits from all the improvements in the latest DOS upgrade, *R:base for DOS*. Although not as elegant as *Paradox's* query-by-example approach, *R:base's* new prompt-by-example method still delivers powerful, menu-driven querying. Developers can take advantage of sophisticated debugging tools, while the new Developer's Express module speeds application development.

R:base for OS/2 incorporates the same selection of Structured Query Language (SQL) commands as the DOS version. Unfortunately, *R:base's* partial implementation of SQL is impractical for transaction processing; too much awkward procedural code would be required to supplement the SQL code. Until the program upgrades its SQL capability, *R:base* users are generally better off using the old *R:base* commands, which are still available.

The concurrency control features offered by *R:base* aren't as polished as *Paradox's*, but *R:base* performs better in a multitasking environment. Both programs implement table- and row-level locking in exclusive mode and in shared mode, so other tasks may select data from a table or row but not insert, delete, or update. *R:base* excels, however, by putting requests for locked resources into a queue. After a specified waiting period, *R:base* cancels requests, avoiding the dead stop you risk with *Paradox's* prompt for user response in a background session.

Another *R:base* plus is its ability to let multiple tasks modify the same record concurrently, provided they don't try to update

EXECUTIVE SUMMARY

R:base for OS/2

OS/2 data management program

Offering multiple sessions rather than support for multiple workstations, *R:base for OS/2* supplies the same functions as the DOS multiuser version. Its overall performance was the best of the programs reviewed, though the DOS version is still faster. *R:base for OS/2* is the best value in the roundup, but it's still only of interest to power users and developers.

	POOR	FAIR	GOOD	EXCELLENT
Concurrency controls				●
Multisession initiation		●		
Development tools				●
Performance			●	
Overall value			●	

the same fields. *R:base* mediates simultaneous record updates by prompting the user to accept the change or overwrite the first task's changes. Of course, if the program queries a background task, the requesting task stalls until the request times out. Developers can turn off this automatic control but must replace it with other processes to ensure data integrity.

Of the four programs, *R:base* is the only one that won't let you run multiple sessions without exiting to the OS/2 prompt. No command equivalent to *Paradox's* Session is provided. The easiest way to run multiple processes in *R:base* is to start sessions from OS/2's Program Selector.

Dataflex 2.3b

Dataflex, unlike *Paradox* or *R:base*, is an unknown quantity for most PC users. It's basically a data management language that has only recently acquired a front end. Among developers, *Dataflex* is known to be an excellent package for creating complex multiuser applications, mostly because the program was ahead of its time in supporting concurrency controls. In addition, *Dataflex* applica-

tions and data are portable not only between the DOS and OS/2 versions, but also among CP/M, UNIX, and VAX/VMS versions.

Slick data entry forms are easy to generate with *Dataflex*. The program also offers powerful built-in data validation functions that would require programming in the other three packages. And although *Dataflex's* report generator isn't as fancy as *Paradox's* query-by-example mode, it's quite extensive. Simply point to the fields you want on a report; enter selection criteria, breakpoints, and headers; and away you go.

Unfortunately, *Dataflex* has one serious problem with its report generator. Instead of using an index to find the records to print, it goes sequentially through the file—and that means very slow reporting. Fortunately, unlike most report generators, *Dataflex's* produces code you can edit, enabling you to optimize reporting. (NSTL fixed the code in its tests, or *Dataflex's* times would have been unrealistically long.) The company claims the report generator will be improved in the next upgrade.

Another drawback is that *Dataflex* can't perform operations quickly across an entire data file. The other three packages allow you to update all records in a file with just one command; *Dataflex*, on the other hand, requires that you write a small program that loops through all the file's records. This might not slow performance, but it does increase development time for certain applications.

Like *Paradox*, *Dataflex* provides a special command, Runprogram Background, for starting other sessions from within the program or a custom application. Once concurrent sessions are loaded, however, *Dataflex* provides only crude file locking. No automatic locking scheme prevents different sessions from editing the same record simultaneously; the developer is entirely responsible for maintaining concurrency control. The locks kick in as you attempt to save a record, when a message tells you that data has been changed and asks you to confirm that you really want to write to disk.

Of the four packages in the roundup, only *Dataflex* and *Informix-SQL* support background transaction processing. To facilitate a

EXECUTIVE SUMMARY

Dataflex 2.3b

OS/2 data management program

Dataflex is a mainframe-style data manager with a powerful development language. Expensive at \$1650, the program supports transaction processing, though the implementation is crude compared to that of *Informix-SQL*. Unfortunately, the report generator is poorly designed and multi-tasking performance is mediocre.

	POOR	FAIR	GOOD	EXCELLENT
Concurrency controls			●	
Multisession initiation				●
Development tools				●
Performance			●	
Overall value			●	

background session with *Dataflex*, you use a special Enter macro that automatically locks all files related to a transaction. Although this implementation is primitive compared to *Informix*'s SQL-based solution, it makes *Dataflex* worth considering for batch-processing tasks, such as those demanded by accounting applications.

Informix-SQL 2.10

Like *Dataflex*, *Informix-SQL* comes from a large-system background, sporting both UNIX and VMS versions. Even with the attempt to present 1-2-3-like menus, *Informix-SQL* is hardly an intuitive program. Its main attraction is its bona fide support for SQL, the nonprocedural data management language of the future. (For an overview of SQL and a review of the DOS version of *Informix-SQL*, see "Tomorrow's Data Bases Today," PCW, February 1988.)

The promise of SQL lies in its potential for portability. In theory, at least, a single SQL query could retrieve data from PCs, minis, and mainframes linked across a wide area network. Currently, this distributed data base scenario is possible only if the

same package is running on all those systems; a standardized SQL is still some years away.

Fortunately, some of SQL's advantages are available right now. Unlike dBASE, R:base, or PAL, SQL employs a nonprocedural engine that optimizes queries. In other words, a user can write a query without having to specify exactly how the query should be performed, such as which indexes to use or the sequence of the proposed operations. For example, you can update records globally across multiple files, without the tremendous programming effort required by procedural languages.

If you don't want to learn SQL, *Informix-SQL* won't leave you in the lurch. Using menus, you can structure data bases; create data entry, query, and report forms; and even develop menu-driven applications. Translation into the appropriate SQL statements is automatic, though unfortunately, SQL lacks the conditional statements necessary for sophisticated application development. For that you must shell out \$995 for *Informix-4GL*, an add-on package that consists of a full-featured, fourth-generation programming language.

SQL brings unique capabilities to a multi-tasking setting, especially if you want to run batch data base transactions in the background. It provides such true relational commands as Commit and Rollback, as well as support for audit trails and transaction logs. Thus, a set of record updates is not committed until the entire transaction has completed successfully. If the process fails midway, because of either locked data resources or failed hardware, the entire transaction can be rolled back and the data restored to its original state.

Commit and Rollback capabilities are a must in environments where data integrity is paramount. Unfortunately for *Informix-SQL*, the other three packages are certain to have their own SQL engines in the near term, so the program's lead in mainframelike processing is temporary. In the meantime, without *Informix-4GL*, *Informix-SQL* has the worst development tools and the hardest-to-use interface of the bunch.

The Developer's Edge

Which upgrade a developer selects usually depends on what package his or her company is already using. After all, everyone wants to avoid having to retrain end users.

Soon enough, though, all these packages will be rewritten for the Presentation Manager, and end users will have to accustom themselves to a new user interface anyway. From this perspective, you're left with such criteria as good concurrency controls, support for background batch processing, and superior performance. Overall, *R:base for OS/2* comes out on top. Although its partial SQL implementation can't provide the secure background batch processing of *Informix-SQL*, the program still offers a platform for developers wishing to explore this realm. In addition, *R:base's* fine set of concurrency controls is complemented by the highest performance under OS/2.

Whether many developers will want to write OS/2 applications with any of these packages before the inevitable Presentation Manager versions come out is an open question. Due to file and code portability to DOS, most of the programmers who buy these packages will probably use them for DOS application development. The OS/2 versions of *Paradox*, *R:base*, *Dataflex*, and *Informix-SQL* are complete implementations of their

EXECUTIVE SUMMARY

Informix-SQL 2.10

OS/2 data management program

Informix-SQL's key advantage is a bona fide SQL engine, which simplifies querying and promises future large-system connections. This mainframe-style program also provides full support for transaction processing. Lackluster speed aside, the main drawback is that serious application development requires a separate \$995 package, *Informix-4GL*.

	POOR	FAIR	GOOD	EXCELLENT
Concurrency controls				●
Multisession initiation		●		
Development tools		●		
Performance		●		
Overall value		●		

DOS counterparts, but they're really interim products. Not only will future versions run under the Presentation Manager, they'll also undoubtedly use multithreading. And that means multiple data management tasks—without having to explicitly run multiple sessions. ●

Hal Chapel is a Northern California consultant specializing in LAN and OS/2 data base development.

WHERE TO BUY

Dataflex 2.3b

Data Access Corp.
14000 S.W. 119th Ave.
Miami, FL 33186
305/238-0012

List price: \$1650

Requirements:
80286 or 80386 PC,
2MB RAM, hard disk,
OS/2 1.0 or later version
Not copy protected

Technical support:
no toll-free number,
M-F 9-5:30

Other support services: \$400 per year
for unlimited toll-free
phone support and up-
grades, \$100 for up-

grades only
For more information,
circle 680 on reader
service card.

Informix-SQL 2.10

Informix Software, Inc.
4100 Bohannon Dr.
Menlo Park, CA 94025
415/322-4100

List price: \$795, *Informix-4GL* \$995

Requirements:
80286 or 80386 PC,
2MB RAM, hard disk,
OS/2 1.0 or later version
Not copy protected

Technical support:
no toll-free number,
M-F 6-5

Other support services:

\$220 per year
for toll-free phone support,
free updates, and a
quarterly technical
newsletter

For more information,
circle 681 on reader
service card.

Paradox for OS/2

Borland Int'l
P.O. Box 660001
Scotts Valley, CA 95066
408/438-8400

List price: \$725

Requirements:
80286 or 80386 PC,
3MB RAM, hard disk,
IBM OS/2 1.0 or later
version
Not copy protected

Technical support:

no toll-free number,
M-F 8-5

Other support services:

Paradox Developers
Resource Program
(\$295) includes toll-free
number and bundle of
PAL applications, BBS
available through
CompuServe

For more information,
circle 682 on reader
service card.

R:base for OS/2

Microrim
3925 159th Ave.
Redmond, WA 98052
206/885-2000

List price: \$895

Requirements:
80286 or 80386 PC,
2MB RAM, hard disk,
OS/2 1.0 or later version
Not copy protected

Technical support:

30 days free support
from date of first call;
M-Th 7-5, F 8:30-4

Other support services: \$175 per year
for unlimited toll-free
phone support, a year's
free updates, a newsletter,
and access to Microrim's
BBS

For more information,
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service card.

Hot Picks in Small Business Accounting

Need a low-cost accounting package but don't know which one's best for your business?

Two CPAs share their insights on eight popular products.

Many people who are shopping for accounting software wonder whether low-cost packages have what it takes to automate their business. As a rule of thumb, low-end software is worth a look if your company does less than about a million dollars in annual sales. Although the best low-cost accounting packages can do a fine job for some larger businesses, at a certain point the extra options and convenience of the high-end systems are well worth the extra cost. Tell-tale signs that your business has outgrown a low-end package include a seven-figure annual gross, more than 200 customer accounts, or more than 300 monthly checks or invoices.

Before you invest in a low-end accounting system, you should be aware of its limitations. As you can see from our Features Evaluation, most low-end general ledgers don't offer power features such as multicompany consolidations; more important, full custom reporting capabilities are rare.

In accounts receivable modules, you're not likely to find great flexibility in billing. Customer-specific billing cycles, trade discounts, and age-dependent dunning notices are usually the province of high-end systems. Accounts payable modules also lack flexibility:

1099 processing and user-specifiable fields for sorting and analysis aren't very common.

Despite these limitations, the best low-end packages can satisfy many businesses' needs at a reasonable price.

How We Evaluated the Software

In searching for the best of the low-priced accounting packages, we looked for products whose quality has been recognized in independent evaluations. We settled on the following eight: *4-in-1 Basic Accounting*, *The Accounting Partner 3*, *Accpac Easy Accounting Series*, *Bedford Integrated Accounting*, *BusinessWorks PC*, *DacEasy Accounting*, *One-Write Plus*, and *Peachtree Complete II*. Although some of these products offer many modules for one base price, this review focuses on the three staples of accounting: general ledger, accounts receivable, and accounts payable.

In judging the packages, we looked especially hard at ease of use. A package's menu system should use plain-English terms, and documentation should be helpful to novices. The data entry process should be intuitive and helped along with useful prompts.

Ralph Soucie and William Flora

Error-trapping devices are very important, particularly for inexperienced users; the best programs display account descriptions during transaction entry and prevent the posting of unbalanced entries.

We prefer batch to real-time processing (in which entries are posted immediately to the general ledger), since it makes it easier to correct erroneous entries before they are posted. However, very small businesses may actually prefer real-time systems because they expedite entry.

Even low-cost packages should provide a good audit trail—a system for referencing transactions from the general ledger report to the individual journals. All the packages tested meet this minimum standard, but some use system-generated transaction numbers, which make tracing through the documents less of a chore.

Accounting software should also provide automated year-end closing and preferably maintain full transaction detail for the entire year until you decide to clear out prior detail. This system is more forgiving of ordinary slipups, because it allows you to enter ad-

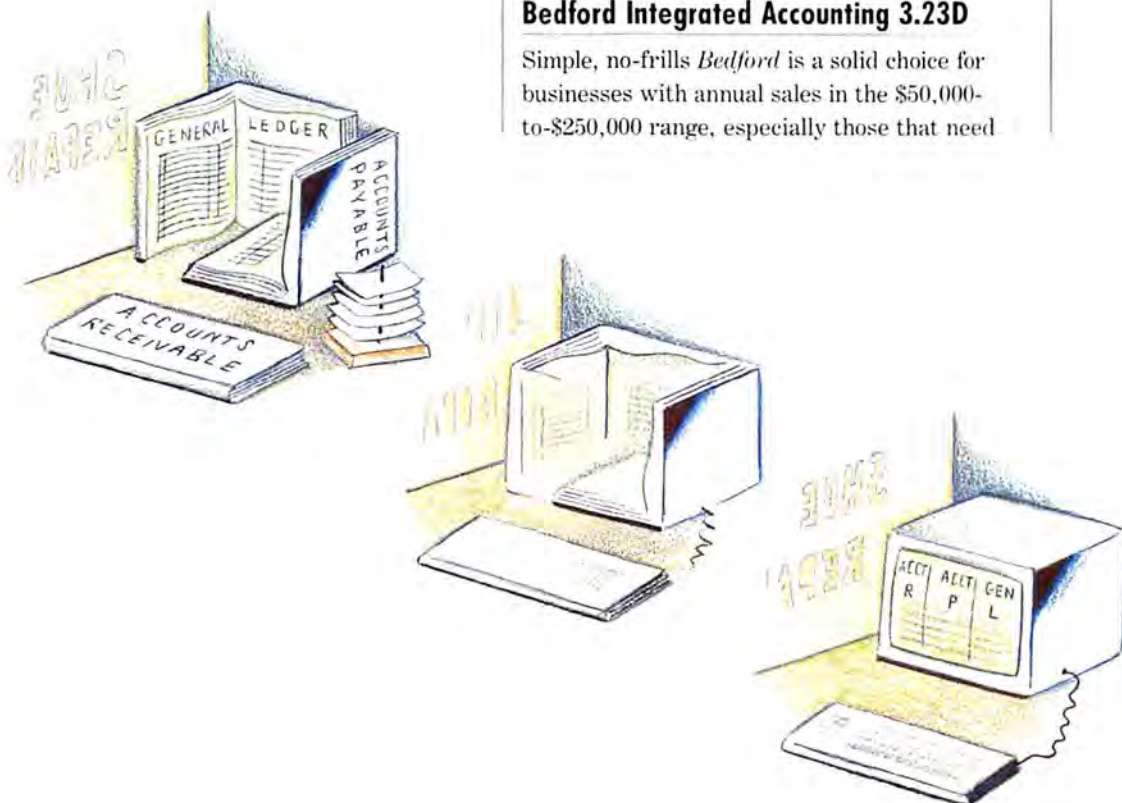
justments into the periods containing the original erroneous transaction.

An important related feature is the ability to maintain several open periods at one time. You'll usually need to begin entering a new month's activity before you have all the information needed to close the prior month. Four open periods is a good minimum because it gets you through the IRS filing deadline without having to close out the prior year.

In our opinion, here's how the products reviewed in this article stack up. *BusinessWorks* and *One-Write Plus* top the list both in power and ease of use and are the most expensive of the group. In the second tier are *Peachtree* and *4-in-1*, both very good values although less capable than the leaders. *Bedford* and *DacEasy* both include six or more modules in the base product yet are priced below \$250. *Bedford* is easy to use but doesn't offer many powerful features. *DacEasy* provides depth as well as breadth, but it still presents challenges to the new user. *Accpac Easy* has the least breadth and depth; it is also inexpensive and quite easy to use. *The Accounting Partner 3* offers power but is difficult to learn.

Bedford Integrated Accounting 3.23D

Simple, no-frills *Bedford* is a solid choice for businesses with annual sales in the \$50,000-to-\$250,000 range, especially those that need



EXECUTIVE SUMMARY

Bedford Integrated Accounting 3.23D

Integrated accounting software

With six easy-to-use modules, including payroll, inventory, and job cost, *Bedford* is a good choice for contractors or retailers who don't need a lot of powerful features.

	POOR	FAIR	GOOD	EXCELLENT
General ledger				●
Accounts receivable			●	
Accounts payable			●	
Audit trail and security				●
Reporting			●	
Overall value				●

a job-cost module. It's not as powerful as *Peachtree* or *DacEasy*, but it's also less intimidating.

Bedford offers six modules—the standard trio plus payroll, inventory, and job cost—for a reasonable \$249. Installation and setup are generally easy, though creating the chart of accounts can be tedious. All account numbers in the program are limited to three digits, which could pose a problem for larger businesses.

Bedford is a real-time system; conveniently, you can make entries to any period of the year. However, you can't keep the prior year open while starting a new year—a serious deficiency, since most users have to wait at least two months to receive year-end adjustments from their accountants.

Although you can print financial statements for any period while the year is open, *Bedford's* reporting is otherwise limited. Budget and prior-year comparison options are lacking, and financial statements have an ungainly side-by-side design. *Bedford Software* reports that a new \$99 reporting module scheduled for release in the first quarter of 1989 will add comparison capabilities and graphs.

Despite its lack of on-line help, *Bedford's* logical menu structure and top-notch documentation should get novices off to a flying start. Overall, *Bedford* is good choice for businesses that require inventory, payroll, or job costing but whose accounting needs are otherwise basic.

One-Write Plus 2

One-Write Plus aims to closely approximate manual bookkeeping on a pegboard, or write-it-once, system. Though this concept may strike some as overly cute, it is so elegantly implemented that *One-Write Plus* is the easiest program to use in its class. Add a hefty list of features, and you have a top-notch accounting package for \$250—and *PC World's* Best Buy award. Excellent accounts receivable and accounts payable modules are also available for \$250 each.

The pegboard metaphor pervades the entire system, providing the same backdrop for all types of transactions. The cash disbursements entry screen looks like a check sitting on a sheet of paper. By scrolling the screen, you can reach as many as 50 expense columns.

EXECUTIVE SUMMARY

One-Write Plus 2

Integrated accounting software



One-Write Plus's master module, with its cash receipts and disbursements entry screens, provides all the accounting many small businesses will need. A top-notch accounts receivable module includes professional services billing; the accounts payable module is also very good.

	POOR	FAIR	GOOD	EXCELLENT
General ledger				●
Accounts receivable				●
Accounts payable			●	
Audit trail and security				●
Reporting				●
Overall value				●

One-Write's master module combines a general ledger with receipts and disbursements entry screens to provide true cash-basis accounting. Data entry is extremely efficient, and function keys are put to maximum advantage. You can enter transactions in any period in the current year and purge transaction detail as needed.

The master module prints checks singly or in batches and maintains addresses and other data for more than 100 customers or vendors. The separately priced accounts receivable and accounts payable modules expand those limits to 2000 entries and provide a fully functional accrual system. (Cash-basis accounting is not supported in these modules.) Customer and vendor master files are nicely detailed, and you can add new accounts while recording transactions. You can choose invoice formats for goods or services; billing for professional services is particularly well implemented.

Though you can't design your own financial statements in *One-Write Plus*, the standard statements should be more than acceptable for most users. A \$15 utility called Financial Statement Editor permits editing of the reports. For more powerful data query

EXECUTIVE SUMMARY

The Accounting Partner 3 3.0P

Integrated accounting software

The *Accounting Partner's* five-module system has strong reporting and other advanced features. We rated the program Fair in general ledger, accounts receivable, and accounts payable because of its awkward interface.

	POOR	FAIR	GOOD	EXCELLENT
General ledger			●	
Accounts receivable			●	
Accounts payable			●	
Audit trail and security			●	
Reporting				●
Overall value			●	

One-Write Plus U2		SOLARIUM SPECIALTIES, INC.		ACCT #1	\$8,327.75
RECORD CASH DISBURSEMENTS					
DATE LINE #	PAID TO EXPLANATION	CHECK NUMBER	CHECK AMOUNT	UTILITIES 0010	MISC COLUMN #2
03/31/89 1	METALBENDERS, INC. PO #834546	8 P	4,568.00	4,568.00	
03/31/89 2	SMITH & JONES TILE PO #834572	8 P	8,657.25	8,657.25	
FOR:MARCH ELECTRIC BILL					
DATE	PAY TO THE ORDER OF	CHECK NO	AMOUNT		
03/31/89	MIDWEST ELECTRIC 1011 SHADY LANE CENTERVILLE, MI 48000	3534 M	581.38	581.38	
Enter the distribution amount.					
F1 Help F2 Edit F3 Del F4 F5 Acct F6 Vend F7 F8 F9 Date F10 Save					

and reporting capabilities, Great American Software offers a \$79 product called *Datalink*.

One-Write Plus's engaging interface and cash-basis capability add up to top value for small businesses. Well-designed accounts payable and accounts receivable modules provide expandability, though *One-Write* yields some ground to *BusinessWorks* in overall power.

The Accounting Partner 3 3.0P

The \$349 *Accounting Partner* is one of the more powerful low-cost packages, but it has a quirky interface. Its market is users who aren't intimidated by computerized accounting and who need strong inventory, purchase-order, and payroll functions in addition to basic accounting. All others should steer clear.

Star Software deserves credit for providing conveniences like multiple pricing codes, a pop-up calculator, and a spreadsheet module. You can also run *The Accounting Partner* on a network, although it's not designed as a multiuser product.

But idiosyncrasies keep cropping up. Entering transactions is problematic, moving within and between input screens is awkward, and if you blunder past a warning message, you can force the system to accept unbalanced general journal entries. End-of-

The well-designed transaction entry screen for *One-Write Plus* resembles a peg-board system. Fifty columns are available for disbursements.

period processing is particularly arcane and frustrating.

The Accounting Partner's reporting setup is unusually flexible for a product in this price range. *DB Partner*, a separate module available for \$195, adds extra query and reporting capabilities. Journal listings and analyses of purchase and sales activity are also very detailed. On-line help is adequate, but the manual is perfunctory.

The Accounting Partner's ability to do cash-basis accounting is a significant bonus. But overall, the learning effort this package requires makes it unsuitable for the average user.

DacEasy Accounting 3.0

DacEasy Accounting offers a broad range of modules and some powerful features for only \$99.95, but it's hobbled by an inflexible data base and unorthodox reporting. Although the interface has improved over the years, *DacEasy* is still not ideal for beginners. On the other hand, *DacEasy* is one of the few programs reviewed that comes with inventory and purchase-order modules. But if you don't need these functions, you're better off

spending the extra money on *BusinessWorks* or *One-Write Plus*.

To its credit, *DacEasy* offers an impressive array of power features. These include support for an unlimited number of accounts, customers, and vendors; quick maintenance of customer and vendor files during transaction entry; ratio analysis reports; and extremely sophisticated password protection.

But *DacEasy* may throw the unseasoned user off stride. Closing a period automatically deletes all transaction detail for that period, and for practical purposes (such as printing monthly financial statements) you can have only two open periods. We would also like to see better safeguards in the audit trail; novices can all too easily forget to print journal listings at crucial points.

DacEasy's departmental accounting is inflexible, and its reporting is a mixed bag. Budget and historical comparison capabilities are strong, and the program's multilevel account structure gives you considerable flexibility in grouping account balances. Yet the financial statements' overall format remains primitive. Many *DacEasy* users will have to resort to the optional \$99.95 *Graph+Mate* program to produce acceptable reports.

Although *DacEasy* offers impressive power for the money, it remains an uneven and eccentric product that requires more patience than the unsophisticated user should be expected to muster.

EXECUTIVE SUMMARY

DacEasy Accounting 3.0

Integrated accounting software

In terms of modules and features, *DacEasy* offers a lot for only \$99.95, but learning to use it requires discipline and patience—perhaps too much to ask of unsophisticated users.

	POOR	FAIR	GOOD	EXCELLENT
General ledger				●
Accounts receivable				●
Accounts payable			●	
Audit trail and security			●	
Reporting			●	
Overall value				●

BusinessWorks PC 6.1

BusinessWorks is a slick program that's easy to use but powerful enough to satisfy the needs of many small and medium-size businesses. Its particularly intuitive menu system includes practically every report and feature such businesses will ever need. This combination of powerful features and ease of use merits *PC World's* Best Buy award.

Installation is smooth, and the system contains plenty of menu choices to get you started in setting up your company's books. You can use your own chart of accounts or one provided by the program. The documenta-

tion contains a useful tutorial based on accompanying sample data.

BusinessWorks is a real-time system—transactions are posted as they are entered. The program holds up to 25 periods of data, which makes for good comparative reporting. Budgets can be done by department and then consolidated into the company total—a nice implementation. Another feature lists which reports have been printed, so that journals and supporting data are not inadvertently lost prior to closing the period and clearing out the detail.

The accounts receivable module features a full range of reports and options, including invoice printing and finance-charge calculations. Both accounts receivable and accounts payable offer a Flash report, which contains critical customer data in summary form.

BusinessWorks is one of the more expensive packages in this roundup—for \$695, you get general ledger, accounts receivable, and accounts payable modules; or you can purchase the modules separately for \$295, plus \$95 for a mandatory system manager. If you're looking for an intuitive, medium-priced accounting package that can do just about everything, *BusinessWorks* should be on your short list.

EXECUTIVE SUMMARY

BusinessWorks PC 6.1

Integrated accounting software



BusinessWorks' numerous power features are elegantly implemented, making it easy for new users to master the procedures. Although more expensive than most of the

other products, it's the most powerful.

	POOR	FAIR	GOOD	EXCELLENT
General ledger				●
Accounts receivable				●
Accounts payable				●
Audit trail and security			●	
Reporting				●
Overall value				●

The Accounting Partner 3 - Accounts Receivable		Copyright (C) 1988 by Star Software Systems		Individual Invoice Entry		Ver 3.00P	
LINE ITEM # 1							
1) Item Number	:						
2) Description	:	Special shipment of Model 36Z					
3) Description	:						
4) Description	:						
5) Price per unit	:	\$6,875.0000					
6) GL Debit Account	:	121.00					
7) GL Credit Account	:	481.00					
8) Quantity	:	2.00					
9) Percent Discount	:	0.000%					
10) Percent Sales Tax	:	0.000%					
Enter number of item to change (or 0 to end) : _							
TOTALS: Sales		\$13,750.00	Disc.	\$0.00	Tax	\$0.00	

4-in-1 Basic Accounting 1.0

4-in-1 is a solid choice for small businesses with annual sales in the range of \$200,000 to \$1,000,000. It should appeal in particular to businesses that need its cash-basis posting option and require an impeccable audit trail.

4-in-1 bundles general ledger, accounts receivable, accounts payable, and payroll modules for \$249.95. Its automated installation offers a choice of three master charts of accounts or lets you create your own. Pre-designed financial statement formats accompany the master charts.

Transaction entry screens aren't quite as helpful as they might be—only one line of a transaction is visible at a time. But full transaction detail is maintained for the current year—a very desirable feature. If you run short of disk space, detail can be summarized and purged on a date you specify.

The accounts receivable and payable modules have sufficient features and flexibility to satisfy the requirements of most small businesses, though they inconveniently omit look-up capability for account distributions. *4-in-1* is one of two packages tested that allow the user to post subledgers to the general ledger on either a cash or an accrual basis.

4-in-1's financial reporting capabilities, although not extensive, are adequate for small businesses. Documentation is satisfactory

The Accounting Partner 3's invoice entry screen is not particularly easy to follow. Note that the program doesn't supply account descriptions (items 6 and 7).

FEATURES EVALUATION

Low-Cost Accounting Feature by Feature

One-Write Plus and BusinessWorks PC lead the pack in useful features, but other packages bundle more modules at lower prices.

- Yes
- No
- ◐ Deficient
- △ Limited only by disk space

	Bestford Integrated	One-Write Plus	Partner 3 The Accounting	DataEasy Accounting	BusinessWorks PC	4-in-1 Basic	Arqer Easy	Peaktree Complete II
General ledger								
Maximum number of accounts	500	500	9999	△	9998	9999	2000	26,000
Highest account balance	\$20 million	\$1 billion	\$1 billion	\$100 million	\$1 billion	\$10 million	\$1 billion	\$1 billion
Maximum digits per account number	3	6	6	6	6	7	4	6
Maximum number of departments	999	99	99	9999	100	999	10	99
Multiple companies	●	●	○	●	●	○	●	●
Multicompany consolidations	○	○	○	○	○	○	○	●
Maintains budget and prior year's data	○	○	●	●	●	○	◐ ¹	●
Automatic recurring entries	○	●	○	○	●	●	●	●
Displays entire transaction during data entry	●	●	●	●	●	○	●	●
On-screen general ledger account inquiry	●	●	○	○	●	●	○	●
Accepts entries outside current period	●	●	○	◐ ²	●	●	●	○
Prints reports to screen	◐ ³	●	○	◐ ⁴	●	●	●	◐ ⁵
Lookup windows	●	●	●	◐ ⁴	●	◐ ⁶	○	●
On-line help	○	●	●	●	●	●	○	●
Exports 1-2-3 files	●	◐ ⁴	● ⁷	○	●	○	●	◐ ⁴
Includes sample data	●	○	○	○	●	○	●	●
Other modules included in base price								
Payroll	●	○	●	○	○	●	○	●
Inventory	●	○	●	●	○	○	○	●
Purchase order	○	○	● ⁸	●	○	○	○	○
Job cost	●	○	○	○	○	○	○	●
Fixed assets	○	○	○	○	○	○	○	●
Batch processing	○	●	●	●	○	●	●	○
Prevents unbalanced entries	●	◐ ⁹	○	●	●	●	●	● ¹⁰
Accounts receivable								
Maximum number of customers	999	2000	16,000	△	△	△	2000	14,400
Handles balance-forward and open-item billing	○	●	○	●	●	●	○	●
Prints invoices	●	●	●	●	●	●	○	●
Customer-specific billing cycles	○	○	○	○	○	●	○	●
Customer-specific payment terms	○	●	●	●	●	●	○	●
Automatically computes discounts for early payment	○	●	○	○	●	○	○	●
Automatically computes trade discount	○	○	○	○	●	○	○	●
Automatic recurring invoices	○	●	◐ ¹¹	○	●	●	○	◐ ¹²
Automatically computes finance charges	○	●	●	●	●	○	○	○
Cash-basis capability	○	○	●	○	○	●	○	○
Optional compounding of finance charges	n/a	●	○	○	○	n/a	n/a	●
Modifiable intervals for aging	●	●	○	●	○	○	○	●
Number of past-due intervals for aging	3	3	3	6	4	3	1	3
Automatically computes sales tax	●	●	●	●	●	○	○	●
Age-dependent dunning notices	○	○	○	●	●	○	○	○

	Bedford Integrated	One-Write Plus	The Accounting Partner 3	DatEasy Accounting	BusinessWorks PC	4-in-1 Basic	Accpac Easy	Peachtree Complete II
Accounts payable								
Maximum number of vendors	999	2000	16,000	△	△	△	2000	14,400
1099 processing and reporting	○	● ⁴	○	●	● ¹³	○	○	○
Vendor-specific payment terms	○	●	●	●	●	○	○	○
Automatic recurring vouchers	○	●	●	○	●	●	○	●
Automatically computes discounts for early payment	○	●	○	○	●	○	○	●
Automatically computes trade discount	○	○	●	○	○	○	○	●
Cash-basis capability	○	○	●	○	○	●	○	○
Check reconciliation	○	○	○	○	●	●	○	○
Holds payments to specified vendors	○	●	○	○	●	○	○	○
Prevents payments in excess of charges	●	●	○	○	●	○	○	○
Dual-month capability	●	●	●	●	●	●	●	○
Audit trail and security								
General journal transactions have a unique reference (such as a number) other than date ¹⁴	●	●	●	●	●	●	●	●
Transactions in other journals have a unique reference other than date ¹⁴	●	●	●	○	●	●	●	○
General ledger transactions have references corresponding directly with unique journal references ¹⁴	●	●	○ ¹⁵	○ ¹⁵	●	●	●	○ ¹⁶
System-level password protection	●	●	○	●	●	●	●	●
Command-level password protection	○ ¹⁷	○ ¹⁷	○	●	●	○	○	○ ¹⁸
Reporting								
Provides financial statement templates	●	●	●	●	●	●	●	●
User can customize templates	○	○	○	○ ¹⁹	○ ²⁰	●	○	●
User can specify column contents for comparisons	○	○	●	○	●	○	●	●
Statement of changes in financial position	○	○	○	●	●	○	○	○
Reports at any time for any period	●	●	○	○	●	●	○	●
Percentage variances	○	○	●	●	●	○	○	○
Aged receivables report	●	●	●	●	●	●	○ ²¹	●
Check register	○	●	●	○	●	●	○	●
Cash requirements report	●	○	○	●	●	●	○	●
Sales analysis by customer	●	●	●	●	●	○	○	○ ⁴
Mailing labels	●	●	●	●	●	○	○	○ ⁴
Optional data base reporter module	●	●	●	●	○	●	○	●

¹ Budget information only.

² Usefulness of this feature is limited because closing a period deletes transaction detail.

³ Screen versions of reports are abbreviated.

⁴ Available through extra-cost module.

⁵ Selected reports only.

⁶ Scrollable lookup windows are provided, but only one line item is displayed at a time.

⁷ Requires use of built-in spreadsheet module as an intermediary.

⁸ Purchase-order functions are included in accounts payable and inventory modules.

⁹ In rare circumstances, system can be forced to accept unbalanced entries.

¹⁰ User can set up system to accept unbalanced entries.

¹¹ Automatic monthly charge capability only.

¹² System can generate monthly statements—but not invoices—containing fixed charges.

¹³ Stores 1099 data, but reporting is cumbersome.

¹⁴ Audit trail data provided by National Software Testing Laboratories.

¹⁵ Transaction references in general ledger correspond with a journal but not with a unique journal reference.

¹⁶ Transaction references in general ledger show individual postings but do not identify journal.

¹⁷ Module-level protection but not command-level protection.

¹⁸ System offers command-specific password protection but cannot limit access to certain important operations.

¹⁹ Financial statement design capability limited to selecting accounts to be included.

²⁰ Account selection is not flexible.

²¹ Report includes columns for current and past-due amounts only.

EXECUTIVE SUMMARY

4-in-1 Basic Accounting 1.0

Integrated accounting software

Though a couple of notches below the most powerful packages in this group, *4-in-1 Basic Accounting* is quite capable, offering cash-basis accounting and the strongest audit trail.

	POOR	Fair	GOOD	EXCELLENT
General ledger			●	
Accounts receivable			●	
Accounts payable			●	
Audit trail and security				●
Reporting			●	
Overall value				●

and well organized, though the package includes neither sample data nor a disk-based tutorial.

Although a good all-around package, *4-in-1* falls somewhat short of *BusinessWorks* and *One-Write Plus* in overall power and ease of use. Still, it merits serious consideration because of its useful features and competitive price.

Accpac Easy Accounting Series 1.0A

At \$89, *Accpac Easy* is the least expensive and least powerful program in this group. Unlike the others, it doesn't provide niceties such as lookup windows or invoice printing. Reporting is less powerful, too—*Accpac Easy* won't do mailing labels or permit customized financial statements.

That said, *Accpac Easy's* main advantage is that it's truly easy to get going. Electronic worksheets assist in the orderly collection of data. The menu system is based on the functional areas of a small business—an approach that simplifies the learning process.

Accpac Easy handles up to four open periods at a time. A command queue that batches multiple menu items can be used for such conveniences as printing multiple reports. Another desirable feature allows the user to set up journals with prompts for the

most frequently used accounts, simplifying data entry and improving reliability.

A payroll module is available for \$89. Users receive a \$50 credit per module when they upgrade to *Accpac BPI* or \$75 per module for upgrading to *Accpac Plus*, the vendor's more comprehensive accounting packages. In the interim, the inexpensive, straightforward *Accpac Easy* may be shy on power but is still a good option for small home-based businesses grossing less than six figures.

EXECUTIVE SUMMARY

Accpac Easy Accounting Series 1.0A

Integrated accounting software

The price leader of the group, *Accpac Easy* features a kindly interface but limited accounts payable, accounts receivable, and reporting capabilities.

	POOR	Fair	GOOD	EXCELLENT
General ledger			●	
Accounts receivable	●			
Accounts payable	●			
Audit trail and security				●
Reporting			●	
Overall value				●

Peachtree Complete II 4.21

Peachtree will appeal to companies that need a comprehensive accounting system at a modest price. For \$199, it provides general ledger, accounts receivable invoicing, accounts payable, inventory, fixed assets, job cost, and payroll—more modules than even *DacEasy*.

Peachtree is generally easy to set up and use. You can assign up to nine source codes to different types of journal entries. But all journals require you to make an offsetting entry, instead of providing it automatically.

The accounts receivable module is full featured and well implemented, including such options as modifiable aging intervals. Pop-up prompt windows for account and customer entries prove very helpful.

Both accounts receivable and accounts payable modules can be run independently or integrated with the general ledger. One note of caution: *Peachtree* allows users to specify whether the program should accept unbalanced transactions or require printing of audit trail reports. If users forget to check these items, they may overlook errors.

The package supports multiple companies and consolidations. Reports are adequate though not extensive. For businesses that require more reporting capabilities, a data query module is available for an additional \$99 (if purchased in bundled form).

Peachtree is marred by two flaws. Its audit trail meets the minimum standards, but because it uses only dates for cross-referencing transactions, you may have to flip through a lot of paper to track down a given transaction if you post from a journal several times in one day. The program also suffers from an annoying inability to have more than one period open at one time.

But if you can live with these shortcomings, *Peachtree* is an excellent deal, offering more modules and features per dollar than any package we know of. It provides a better interface and more modules than many programs at a very low cost.

EXECUTIVE SUMMARY

Peachtree Complete II 4.21

Integrated accounting software

Peachtree offers just about everything *DacEasy* does but adds payroll, job-cost, and fixed-assets modules. It's a very good value despite its inability to handle more than one open period at a time.

	POOR	FAIR	GOOD	EXCELLENT
General ledger				●
Accounts receivable				●
Accounts payable			●	
Audit trail and security		●		
Reporting			●	
Overall value				●

BikeWorks International Posting Date: Jun 30, 1987
Post to General Journal

Header Information
 Type of entry: **Standard** Current month:
 Voucher Ref #: _____ Posting to:
 Transaction date: _____
 Description: _____

Acct #	Description	Debit	Credit
Unposted Balance			

Select entry type: Done **Standard** Recurring Correcting Reversing

[Esc: Main Menu] [F1: Help]

The Bottom Line

BusinessWorks and *One-Write Plus* are the best of the bunch. If you need all three *BusinessWorks* modules, you can't do better for \$695. But if all you want is general accounting, *One-Write Plus's* master module is an outstanding deal. At \$250, it boasts the best interface and documentation in the group. *One-Write's* other modules aren't bad, either.

Aggressively priced *Peachtree* is an easily justifiable choice, especially if you need job-cost or fixed-assets modules. *4-in-1* is a good all-around package, especially if you want cash-basis accounting, and at \$249.95, the price is right. However, both lag behind the leaders in features and flexibility.

DacEasy offers many modules and features, but it's slightly quirky. *Bedford's* six modules are easier to use than *DacEasy's* but lighter on power. Although *Accpac Easy* is extremely limited, in terms of price and features it's fine for the fledgling home business. Finally, *The Accounting Partner 3*, while powerful, is not intuitive enough to be recommended for a general audience.

But what if, among all these low-cost contenders, you can't find a system that is strong in all the right areas? One solution is to go high end. If you want to save money, another alternative is to shore up the weak spots with a spreadsheet or a data base application. If a low-cost system doesn't offer a job-cost module, for example, you can track job costs on a spreadsheet, provided your

At appropriate times, *BusinessWorks* automatically supplies convenient field-specific prompts (shown at the bottom of the screen). The information can be selected directly from the menu.

needs are relatively modest. Or you can use a graphing package to produce better-looking management reports. As long as the solution isn't a kludge, the money you save could be substantial. ●

Ralph Soucie is a CPA and consultant with Brian Murphy & Associates in Lake Oswego, Oregon. William Flora is a practicing CPA and president of Oregon Tax & Accounting Software, Inc., in Portland.

WHERE TO BUY

4-in-1 Basic Accounting 1.0

RealWorld Corp.
282 Loudon Rd.
P.O. Box 2051
Concord, NH
03302-2051
800/255-1115

List price: \$249.95 includes general ledger, accounts receivable, accounts payable, and payroll

Requirements: 256K, DOS 2.1 or later version
Not copy protected

Technical support: first 15 minutes \$30, \$2 per minute thereafter or \$175 for six months' unlimited calls and automatic product updates; no toll-free number, M-F 9-8

Other support services: none
For more information, circle 750 on reader service card.

The Accounting Partner 3 3.0P

Star Software Systems
363 Van Ness Way
Torrance, CA
90501-1494
800/242-7827

List price: \$349 includes general ledger, accounts receivable, accounts payable, payroll, inventory, and spreadsheet; Invoice Partner \$195, DB Partner \$195
Requirements: 384K (512K recommended), DOS 2.1 or later version
Not copy protected

Technical support: \$100 quarterly (maximum 3 hours); \$250 annually (maximum 12 hours, includes free up-

dates); toll-free number, M-F 7-5

Other support services: newsletter; training available
For more information, circle 751 on reader service card.

Accpac Easy Accounting Series 1.0A

Computer Associates
1240 McKay Dr.
San Jose, CA 95131
408/432-1727

List price: \$89, Payroll 1.0 \$89

Requirements: 320K, DOS 2.0 or later version
Not copy protected

Technical support: free for first 30 days after registration (but limited to two calls per module of up to 10 minutes each), no toll-free number; extended support \$50 if enrolled within 30 days, \$75 if after 30 days, limited to four calls per year, toll-free number, M-F 7-5

Other support services: newsletter, 30-day money-back guarantee, user BBS on The Source

For more information, circle 752 on reader service card.

Bedford Integrated Accounting 3.23D

Bedford Software Corp.
15311 N.E. 90th St.
Redmond, WA 98052
206/883-0074

List price: \$249 includes general ledger, accounts receivable, accounts payable, payroll, inventory, and job cost; Integrated Toolbox re-

porting module \$99 (release date is first quarter 1989)

Not copy protected
Requirements: 384K, DOS 2.0 or later version

Technical support: free for 30 days, then \$89 per year including updates; no toll-free number, M-F 8-5

Other support services: newsletter in Canada only
For more information, circle 753 on reader service card.

BusinessWorks PC 6.1

Manzanita Software Systems
One Sierra Gate Plaza #200A
Roseville, CA 95678
800/531-3552,
800/447-5700 California

List price: \$695 includes system manager, general ledger, accounts receivable, and accounts payable modules; mandatory system manager \$95, general ledger \$295, accounts receivable \$295, accounts payable \$295, payroll \$295

Requirements: 256K, DOS 2.1 or later version, 10MB hard disk
Copy protected

Technical support: free for 90 days, then \$150 per year (including minor updates); toll-free number, M-F 8-4

Other support services: none
For more information, circle 754 on reader service card.

DacEasy Accounting 3.0

Dac Software, Inc.
17950 Preston Rd. #800
Dallas, TX 75252
800/877-8088

List price: \$99.95 includes general ledger, accounts receivable, billing, accounts payable, inventory, and purchase order; Payroll \$99.95, Graph + Mate \$99.95, Accounting Tutor \$29.95, Payroll Tutor \$29.95, Video Tutor \$49.95
Requirements: 256K, DOS 2.0 or later version
Not copy protected

Technical support: 10 minutes free within 60 days of purchase, no toll-free number; one year of support for all Dac products (limited to 60 minutes) \$75, one year of support for one Dac product (limited to 30 minutes) \$45, toll-free number, M-Th 8-5, F 9-5

Other support services: newsletter; training available
For more information, circle 755 on reader service card.

One-Write Plus 2

Great American Software
9 Columbia Dr.
Amherst, NH 03031
800/528-5015

List price: master module \$250, accounts receivable \$250, accounts payable \$250, payroll \$250, Datalink \$79

Requirements: 384K, DOS 2.1 or later version
Not copy protected
Technical support: 30 days free with purchase of first module, 15

days more with purchase of each additional module, no toll-free number; toll-free continuing support \$125 per year, covering all purchased modules, includes discounted upgrades and access to BBS; "a la carte" support \$1.50 per minute, 10-minute minimum; M-F 9-7

Other support services: none
For more information, circle 756 on reader service card.

Peachtree Complete II 4.21

Peachtree Software, Inc.
4335 Shackleford Rd.
Norcross, GA 30093
800/247-3224

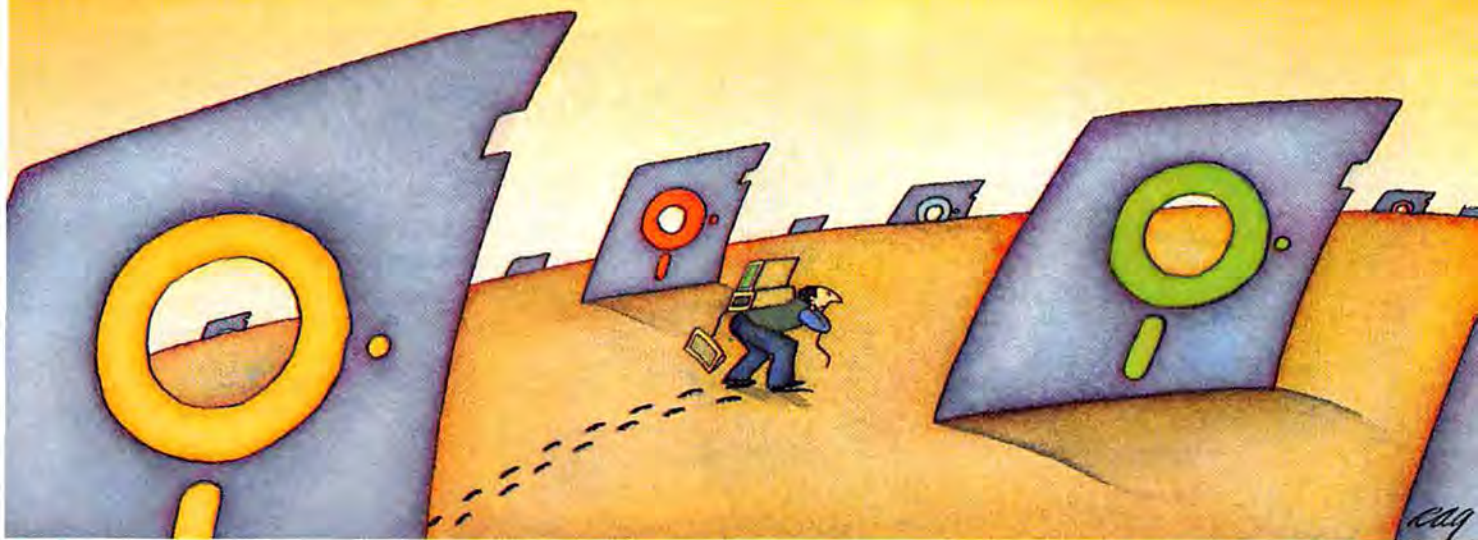
List price: \$199 includes general ledger, accounts receivable invoicing, accounts payable, payroll, inventory, job cost, and fixed assets; with Peachtree Data Query II \$298

Requirements: 384K, DOS 2.0 or later version, 10MB hard disk
Not copy protected

Technical support: \$1 per minute with \$20 minimum per call, toll-free number, M-F 8:30-5:30

Other support services: 30-day money-back guarantee if product is purchased directly from Peachtree; newsletter; training available from 60 support centers nationwide

For more information, circle 757 on reader service card.



Don't drag your PC along! Take the shortcut between programs and files with Software Carousel.[®]

Why get dragged down by that old PC technology?

Despite the sophistication of today's PCs, there's one thing they still don't do. And that's work the way people work. Jumping from one task to another—from budgets to memos to phone calls and back.

So every time you need to change programs—or just look at another file—it's the same old, tiresome routine—saving, exiting, loading, retrieving. Not very convenient. Not very human. Now you could wait for the "next generation" of computers. Or use Software Carousel, and get the speed and convenience you need today, with the software, and computer, you already own. **Here's how to make Software Carousel work for you.**

Software Carousel is the amazingly easy way to switch almost instantly from Word-Perfect to 1-2-3 to dBASE to DOS to whatever else you want. Or go from one file to another in the same program. All without saving or retrieving—or wasting a precious moment of your time. Or your computer's memory.

It works by creating a number of independent software slots to load your programs into. You get up to ten of these software slots, so you can load up to ten programs.

Need to crunch numbers? Hit a key and there's your spreadsheet. Need your word processor? Don't bother saving your spreadsheet file. Just whip over to your document and do your work. Snap back to your spreadsheet and it's just like you left it. It's like all your programs are "pop-ups," just a hotkey away.

Or load the same program into a few different slots, each with a different file. Now go from one to another in an instant.

Here's the best part of all.

You may have heard about some other "environment" programs that claim to do something similar to Software Carousel. But there are several important differences.

First, they make you split your memory up among the programs you want to use. Software Carousel lets you use all available memory in each and every program. It even supports expanded and extended memory.

Other environment programs work with only some software. Software Carousel

works with everything. Period. It even resolves conflicts among memory resident programs.

Other software creates a working environment that's complex, unfamiliar, with cramped little windows and strange commands. Software Carousel takes minutes to set-up just the way you want it. All your software looks and acts exactly as it always did. **It's so downright useful, even IBM[®] recommends it.**

Even as you read this page, there are tens of thousands of Software Carousel users zipping through their work without laborious and repetitive commands. And without the usual 640K limit imposed by DOS. In fact, even IBM recommends Software Carousel for use with their most popular mainframe-to-PC communications package.

We think you'll agree, that with this kind of speed, convenience, and next-generation performance, \$79.95 is a small price to pay.

Look for Software Carousel at software dealers everywhere. Or order direct from SoftLogic Solutions by calling us toll-free. If, after thirty days, you're not satisfied that Software Carousel is the right way to get that old PC technology off your back, we'll gladly arrange for a refund of your purchase price.

Here's what people are saying about Software Carousel:

"Can't believe how well it works. Who needs 80386?"
—Ralph Evans, Attorney, Fullerton, CA

"Unlike other attempts (e.g. MS Windows, DesqView) yours works, is not fragile and does not intrude its "personality" on everything that we do."
—Colin Ralph, Ralph & Panzer, Inc., Seattle, WA

"Fantastic program. Great book. Saves me an hour a day! Thanks."
—Larry Pearsal, Rolling Hills Covenant Church, Rolling Hills Estates, CA

"Solved all my problems with resident software."
—Walter Affouritt, West Islip, NY

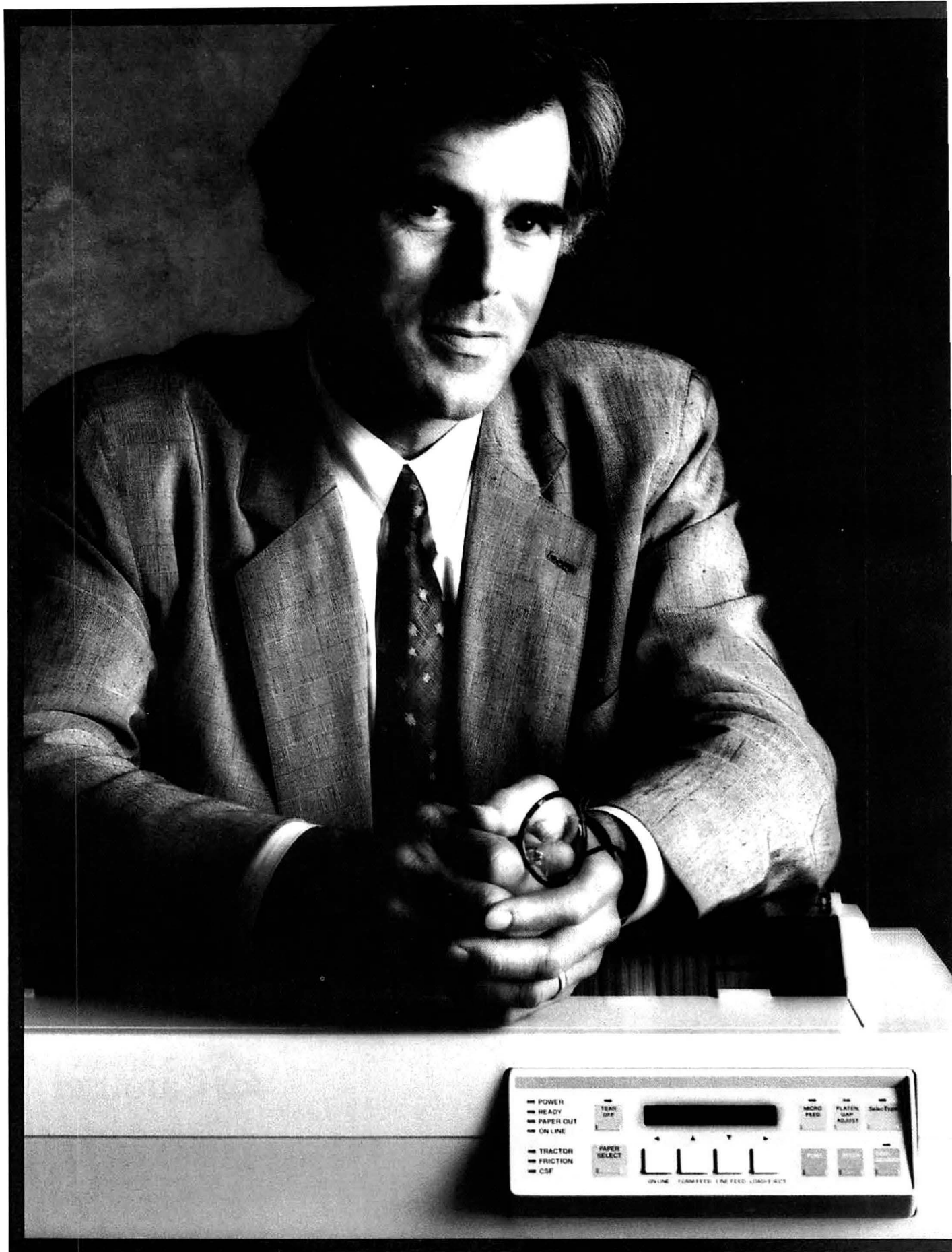
Software Carousel \$79⁹⁵

SOFTLOGIC SOLUTIONS

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(603)-627-9900 in NH

Call 800-272-9900

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Epson LQ-2550. 24-pin; 400 CPS/draft; 133 CPS/letter quality; 360 x 360 bit image graphics; 136 column carriage; short form tear-off; automatic paper thickness and top of form adjust; optional dual-bin cut sheet feeder; one year limited warranty. Epson is a registered trademark of Seiko Epson Corporation. SmartPark is a trademark of Epson America, Inc., 2780 Lomita Blvd., Torrance, CA 90505. **(800) 922-8911.**

“There’s no question I wanted a letter quality printer. One with lots of typestyles. Color, if I could get it. Wide carriage. Paper handling. And controls that make it very easy to use. This new Epson I bought has it all. In fact,

if this printer can’t do it, you probably don’t need it done.”

From the leader in dot matrix printing comes the ultimate letter quality printer. The new Epson® LQ-2550. Among its many features you’ll find seven perfect typestyles, high-quality graphics, built-in color and Epson’s advanced SmartPark™ paper handling.

SmartPark is the easiest way ever to alternate between fanfold and single sheet paper. Or envelopes. Or even forms. And you can control just about everything with one touch of our SelecType panel.

To keep your work flowing, the LQ-2550 includes time-saving macros. Use them to pre-set your printer for the formats you use most often. Memos, spreadsheets, graphs, business letters. After that, one button is all it takes.

The **LQ-2550** remembers the settings for you.

In addition, the LQ-2550 comes with something nobody else’s letter quality printer will ever have. Epson’s undeniable reputation for reliability, performance and value. Anything less just won’t do.



**WHEN YOU’VE GOT AN EPSON,
YOU’VE GOT A LOT OF COMPANY.™**

TOPS—The Low-End Link to Macs

Looking for a friendly PC LAN that lets you connect PCs, Macs, and LaserWriters without spending a bundle?

TOPS may be the answer.

When businesspeople think about LANs, they generally think of two kinds: high-end, full-featured work-group products, like *NetWare* and *3 + Share*; and low-end serial LANs that offer little more than file transfer and printer sharing. TOPS (Transcendental OPERating System), a low-cost, twisted-pair LAN from Sun Microsystems, falls somewhere in between.

TOPS 2.0 provides many features of the high-end LANs at a fraction of the cost—and requires neither a costly, dedicated server nor a costly, dedicated network administrator. Its biggest plus is that it lets you connect PCs with Macs and LaserWriters. Its biggest minus is that you can't run multiuser network applications like *dBASE*, *Higgins*, or *WordPerfect 5.0*.

TOPS is memory resident but it's well-behaved; it runs alongside *SideKick*, *SuperKey*, and most other popular TSR applications without a hitch. Easy to use and install, its biggest drawbacks (aside from lack of multiuser support) are low speed and an official 32-node ceiling. In fact, if you try to run more than 10 nodes you're asking for trouble.

Within these limits, however, TOPS delivers the goods. Like the big-league LANs, it lets you copy files from one computer to another, access remote data files, run programs that reside on remote computers, share printers, and exchange E-mail. But for most

users, TOPS's main attraction is the way it bridges the chasm between the two leading personal computer platforms by allowing PCs and Macs to exchange files, share printers, and send E-mail. (Unfortunately, neither TOPS nor any other network can enable you to run Mac applications on a PC, or vice versa.)

Up in a Hurry

Setting up TOPS hardware is delightfully simple. Each PC needs a half-length 8-bit network board called a Flashcard, along with a Teleconnector—a small adapter with two standard telephone jacks that attaches to the Flashcard. (If you're looking for a slot-saving alternative, Hercules will sell you a special version of its Graphics Card Plus with a TOPS port added; no additional Flashcard is required.)

Since networking capability is built into every Apple LaserWriter and Macintosh, these components don't need Flashcards; you can attach Teleconnectors to them directly. Then, just link the Teleconnectors with standard twisted-pair telephone cable, and you're networked. (A TOPS network can span 4000 feet—12,000 feet with a \$189 repeater.)

Installing TOPS software is equally painless. On the PC side, you use the menu-

**Robert
Lauriston**

driven installation program to copy the program to your hard disk. You may also need to edit a parameters file with a word processor; this procedure is a bit tricky for first-timers and would be far easier to handle if it were part of the installation program. On the Mac, you run the Installer to copy the software to the Mac's hard disk and then drag the appropriate printer files into your system folder with the mouse.

Working on the Net

Logging on to a TOPS network requires no password; you just run a simple batch file. The familiar DOS prompt appears, and you can go right to work as usual.

Although TOPS runs at only 750 kilobits per second (significantly slower than ethernet's 10 megabits), under normal circumstances network access seems as fast as if you were reading data off a local hard disk. Under heavy usage, however, you'll notice performance degradation as the number of users increases.

Accessing remote data or hardware, or making your own data available to others—a procedure known as *publishing*—is done via the simple TOPS menu. Using the menu, you can assign drive letters to remote directories (whether on a PC or a Mac); you can also identify remote printers as ports (LPT1, COM1, and so on) and then install your applications to use those ports automatically. Once you've acquired access to a useful set of remote directories and printers, you can save those assignments to a batch file and load them automatically each time you start up.

Because a TOPS network has no central server, the notion of a network printer requires some adjustment. TOPS allows you to use any printer connected to any PC, assuming the user of that PC has made it available and you have given it a port assignment, as well as any Apple LaserWriter connected directly to the net. (The \$189 *NetPrint* program is required if you want to print from within DOS applications to an Apple printer.) TOPS provides a print queue that displays a list of jobs waiting to print, client names, and the size of each job.

Some programs available for both the PC and the Mac (such as *PageMaker* and *Micro-*

soft Word) can use TOPS to open compatible data files on any PC or Mac on the network. For other programs, TOPS includes a Mac application that can convert most data files—like those created in *1-2-3*, *WordStar*, and *MultiMate*—to and from foreign formats quickly and effectively.

The Bottom Side of TOPS

Since TOPS does *not* require an administrator, administrative options are minimal. For instance, full network backup is impossible. You can back up your own work, of course, and any published directory can be

TOPS TOPS ITSELF

According to Sun, TOPS 2.1, a major upgrade at no increase in cost, should be shipping by the time you read this. It will offer ethernet and NETBIOS support, full DOS 3.3 file and record locking, *WordPerfect 5.0* compatibility, and an option that allows you to install a stripped-down version of the operating system that uses only 90K of memory. Upgrades to previously installed systems will be available for \$30 to \$45.

—R. L.



FEATURES EVALUATION

Mac-PC Network Challenge: TOPS Versus 3+Share

The TOPS network lacks the administrative features of 3+Share but delivers comparable Mac-PC connectivity—at less than one-third the price.

- Yes
- No

	TOPS 2.0	3+Share 1.3.1
Price		
4-PC, 1-Mac network exclusive of workstation computers ¹	\$3012	\$9785
Setup and installation		
Dedicated server required	○	●
Menu-driven software installation		
Server	●	● ²
Workstation	●	●
Attaching Mac workstation requires board	○	●
Maximum number of stations per LAN	32	unlimited
Maximum number of remote directories at once	10	26
Printer installation		
Access to LaserWriter	●	●
Access to PC workstation printers	●	○
Printer can be attached directly to net	●	○
RAM required by workstation software	220K	100K
Auto log-on (via batch file, etc.)	●	●
Unloads network software without rebooting	●	○
Changes and saves directories accessed at log-on	●	●
Context-sensitive help	○	○
DOS shell	○	●
File and printer sharing		
Runs remote applications	●	●
Opens remote files	●	●
Mac-PC connectivity		
Mac folders appear as DOS subdirectories on PC	●	●
DOS subdirectories appear as folders on Mac	● ³	●
PC has full access to Mac text/data files	●	●
Mac has full access to PC text/data files	● ³	●
Background translation between Mac and PC files	○	●

File and printer sharing (continued)

	TOPS 2.0	3+Share 1.3.1
File and printer sharing (continued)		
Multiuser features		
NETBIOS compatibility	○	●
Multiple users can edit same file at once	○ ⁴	●
Full DOS 3.3 file and record locking	○	●
Printing		
Local printer on any PC can be made available to the network	●	○
Local printer on Mac can be made available to the network	○	○
Print queue	● ⁵	●
Administration		
Security		
Log-on password	○	●
Can restrict file creation and deletion in subdirectory	○	●
Can limit subdirectory access to one user at a time	○	●
Utilities		
Troubleshooting	○	●
Traffic monitor	○	●
Menu-driven backup software	○	●
Backs up entire network	○	●
Training		
Recommended	○	●
Available from company	○	●

¹ Price includes network boards and LAN operating system. 3+Share price includes a low-end (\$3000) 80386 server; TOPS price includes NetPrint for all PCs.

² Installation requires 3+ installation and administration course or experience in network installation and is usually done by vendor.

³ Requires desk accessory.

⁴ Multiple users can use file at the same time if application does not require NETBIOS.

⁵ Cancel only, no reordering.

backed up on any other PC. However, if any directories are unpublished, there's no way for a system administrator to back up the whole network. Security is also a weak area.

Another of TOPS's major flaws is its hunger for memory. It eats 220K of RAM; after loading DOS and TOPS on a 640K machine,

you may be left with as little as 350K—not enough to load large spreadsheets or run RAM-intensive applications. As a solution, TOPS suggests RYBS Electronics' Hicard, which includes a memory management program that allows most TSRs, including

TOPS, to run in unused memory between 640K and 1MB. (There's no support for expanded memory.)

Not the Tops, but Good Enough

If Mac connectivity is not a big issue at your office, or multiuser capability is, you may do better with Novell's entry-level *NetWare ELS*, which provides higher performance (via ethernet), multiuser support, better security features, and an upgrade path at about the same price. However, *NetWare ELS* is limited to 5 nodes; theoretically, TOPS can go as high as 32, although 10 or 12 is the practical limit. Moreover, *NetWare* does not yet talk to Macs.

3 + Share does talk to Macs; what's more, it's faster than TOPS and offers full multiuser support. But this power doesn't come cheap. To connect four PCs, one Mac, and a LaserWriter with *3 + Share*, you'll pay about \$10,000 (not including the workstation computers and printer), while a comparable TOPS installation comes in at only \$3000. *3 + Share* may also require costly attention from an installation consultant, as well as a trained administrator.

TOPS is one of those products that trade off a certain amount of power in return for a tempting price and ease of use. If Mac connectivity is a must and you can forgo multi-

EXECUTIVE SUMMARY

TOPS 2.0

LAN operating system

TOPS is a low-cost, easy-to-install, easy-to-use PC network that offers Mac connectivity plus most of the core features of conventional dedicated-server networks—except for multiuser application support. It's a bit slow, can't really handle more than 10 or 12 stations, and comes up short on security and administrative features. But if Mac connectivity is essential and you don't use multiuser applications, it delivers real value at a bargain price.

	POOR	FAIR	GOOD	EXCELLENT
Setup and installation				●
File and printer sharing			●	
Administration			●	
Overall value			●	

user applications, TOPS will let your Macs and PCs make beautiful music together—accompanied by the pleasant sound of the cash you saved jingling in your pockets. ●

Robert Lauriston is a San Francisco-based computer consultant specializing in Word-Perfect and LAN installations.

WHERE TO BUY

TOPS

Sun Microsystems
950 Marina Village
Pkwy.
Alameda, CA 94501
415/769-9669

List price: TOPS-DOS \$189, TOPS-Mac \$249; NetPrint \$189; Teleconnector \$59; Flashcard \$239; repeater \$189

Requirements: DOS 2.1 or later version, 512K RAM

Warranty: one year unlimited parts and labor

Extended warranty: none

Technical support: no toll-free number, M-F 7-5

Other technical support:

BBS, BIX
For more information, circle 601 on reader service card.

RYBS Hicard

RYBS Electronics
2590 Central Ave.
Boulder, CO 80301
303/444-6073

List price: unpopulated \$179, with 512K RAM \$590; HI386 software \$169

Requirements: DOS 2.0 or later version

Warranty: two years unlimited parts and labor

Extended warranty: none

Technical support: no toll-free number, M-F 8-6

Other technical support: BBS

For more information, circle 602 on reader service card.

Hercules Network Card Plus Total Network Solution

Hercules Computer Technology, Inc.
921 Parker St.
Berkeley, CA 94710
415/540-6000

List price: with 512K Screenfont RAM, Teleconnector, and TOPS software \$618

Requirements: none
Warranty: two years unlimited parts and labor

Extended warranty: none

Technical support:

no toll-free number, M-F 8:30-5

Other technical support: none

For more information, circle 603 on reader service card.



126 IBM PS/2 Model 30 286

The AT bus rides again, in a sleek new PS/2 system. A highly integrated motherboard and disk caching software may offset hard disk and expansion limitations for IBM 286 regulars.

130 Arche Pro-File 286

A class act in nearly every respect, this hot new AT-compatible tower gives more than one 386 a run for the money.

132 Hewlett-Packard LaserJet IID

HP's industrial-strength version of the LaserJet II adds duplex printing, a wealth of fonts, and a powerhouse print engine for heavy-duty office use.

136 Intel 2400B Modem 2, MultiTech MT224ES

Both of these 2400-bps internal modems equal the Hayes in software compatibility and performance, and both are excellent buys, but one has a definite edge.

146 Plus Passport

Plus Development's breakthrough removable drive combines easy installation with speed that rivals conventional hard disks.



The IBM Model 30 286 is the first PS/2 to revert to the AT bus. VGA is built in, but the only hard disk IBM offers is a low-capacity 20MB unit.

IBM PS/2 Model 30 286

AT-compatible system

PROS: Small footprint, highly integrated motherboard, disk caching software included

CONS: Slow, small hard drive; meager standard memory; limited device-expansion capacity

When IBM first announced its line of PS/2 computers, it claimed the new Micro Channel bus was the architecture of the future. Many users were not convinced. The new PS/2 Model 30 286 suggests that even IBM may be starting to wonder whether the Micro Channel is the *only* road to the future. The first PS/2 that reverts to IBM's original 16-bit AT bus, this sleek new 80286 system combines the familiar features of the good ol' AT with the compact modernism of the PS/2.

The Model 30 286 (\$3405 with 1MB of RAM, a 1.44MB 3½-inch disk drive, a VGA color monitor, and a 20MB hard disk that boasts its own on-board controller) sports a highly integrated motherboard with built-in VGA; floppy controller; parallel, serial, and mouse ports; and a socket for the hard drive—all packed into a slim silhouette. On the downside, its 10-MHz CPU running at one wait state is a bit underwhelming now that 12-MHz systems are more common. But its most serious drawback is a slow (80ms), low-capacity (20MB) hard disk.

Thanks to the disk caching software that IBM bundles with it, the Model 30 286 performed decently on National Software Testing Laboratories (NSTL) benchmarks, despite the slow drive. The system ran neck and neck with the original 10-MHz IBM Model 50 (not shown) and the AST Premium/286 Workstation 243X. As you might imagine, it passed the NSTL Crash Test without a hitch.

The basic system includes a measly 512K of 120ns RAM, a low count considering that many 80286-based machines now come with 1MB of standard RAM. On the other hand,

the well-designed motherboard holds up to 4MB of RAM via two upgrade options—512K (\$215) or 2MB (\$995). There's a socket for an 80287 math coprocessor as well.

The unit's small size necessitates some trade-offs. For instance, there's room for only three 8/16-bit expansion slots; but because IBM has built so much into the system board, the three-slot limit won't be much of a problem for most users.

Other compromises are harder to take. Not only is the Model 30 saddled with a slow, small hard drive, you're stuck with it, and IBM has revealed no plans to offer a faster or larger drive. Furthermore, with hard disk and floppy drives occupying the Model 30's two half-height drive bays, adding a second internal hard disk requires a hard disk on a card, such as Plus Development's Hardcard.

With its thoughtful package of motherboard integration, small footprint, and familiar AT bus, the Model 30 286 could have been a big winner, a kind of latter-day AT. But the old IBM foibles persist. A single hard disk option, and a poor one at that, is unacceptable, and selling an 80286 machine with only 512K is downright silly.

And as usual, the price is wrong; for only \$50 more, you could get the small-footprint AST Premium/286 Workstation with a fast, 40MB hard drive. Still, for many business users, Big Blue's reputation for reliability and service outweighs everything else, and for those poor, benighted souls the Model 30 286 may well be the AT of the nineties.

—Paul Meyers

WHERE TO BUY

IBM PS/2 Model 30 286

IBM
900 King St.
Rye Brook, NY 10573
800/447-4700

List price: with 512K RAM, 1.44MB floppy drive and controller, VGA, parallel port, serial port, mouse port, DOS 4.0 \$1995; with 20MB hard drive \$2595

Accessories: 12-inch VGA Mono-

FEATURES EVALUATION

New 286 Systems: Features Face-Off

IBM's PS/2 Model 30 286 bests AST's Premium/286 Workstation in slot expandability and price. The 16-MHz Arche Pro-File is \$1167 less than the 12-MHz Compaq Deskpro 286 and boasts a smaller footprint.

- Yes
○ No

	IBM PS/2 Model 30 286	AST Premium/286 Workstation 243X	Arche Pro-File 286	Compaq Deskpro 286
Standard features				
Price	\$3405 ¹	\$3805 ²	\$4330 ³	\$5497 ⁴
CPU	80286	80286	80286	80286
CPU speed	10	6/10	8/16	8/12
Built into motherboard				
Parallel ports	1	1	○	○
Serial ports	1	2	○	○
Floppy disk controller	●	●	○	○
Video adapter	●	●	○	○
Mouse port	●	○	○	○
Coprocessor support	10-MHz 80287	10-MHz 80287	10-MHz 80287	8-MHz 80287
Disk caching software included	●	●	○	●
Complete documentation	●	●	●	●
Memory				
Basic unit	1MB	1MB	1MB	1MB
Bus capacity	4MB	4MB	8MB	8MB
Expandability				
8/16-bit expansion slots/number free	3/3	2/2	6/4	6/4
8-bit expansion slots/number free	0/0	0/0	2/1	2/2
Half/full-height storage device bays	2/0	2/0	2/2	4/2
120MB or larger hard disk available from manufacturer	○	○	●	●
Ergonomic design				
Switchless installation	●	○	●	○
Compact footprint	●	●	● ⁵	○
Tilt-and-swivel monitor	●	●	●	●
Front-panel reset button	○	●	●	○
Front-panel on/off switch	●	●	●	○

¹ Price includes 1MB of RAM, 1.44MB floppy drive, 20MB hard disk, parallel port, serial port, VGA, color monitor, 101-key keyboard, DOS 4.0.

² Price includes 1MB of RAM, 1.44MB floppy drive, 40MB hard disk, parallel port, two serial ports, VGA, color monitor, 101-key keyboard, DOS 3.3.

³ Price includes 1MB of RAM, 1.2MB floppy drive, 44MB hard disk, parallel port, two serial ports, EGA board and monitor, 101-key keyboard, DOS 3.3.

⁴ Price includes 1MB of RAM, 1.2MB floppy drive, 44MB hard disk, parallel port, serial port, VGA, color monitor, 101-key keyboard, DOS 3.3.

⁵ Floor-standing model.

NSTL TEST REPORT

Two New Systems Race the Competition

IBM's PS/2 Model 30 286 runs neck and neck with AST's small-footprint Premium/286 Workstation 243X on 1-2-3, Word, and dBASE but slips a bit behind on C. Predictably, the 16-MHz Arche Pro-File 286 trounces the 12-MHz Compaq Deskpro 286.

Microsoft Word

Arche Pro-File	108
Compaq Deskpro	146
AST Workstation	172
PS/2 Model 30 286	175

seconds 0 35 70 105 140 175

dBASE III Plus

Arche Pro-File	101
Compaq Deskpro	127
PS/2 Model 30 286	153
AST Workstation	157

seconds 0 35 70 105 140 175

1-2-3

Arche Pro-File	181
Compaq Deskpro	258
AST Workstation	304
PS/2 Model 30 286	305

seconds 0 60 120 180 240 300

All machines were tested with a coprocessor and a disk cache consisting of 256K in extended memory for all tests except the 1-2-3 benchmark. The 12-MHz Compaq Deskpro 286 was configured with a 42MB hard disk and 2.1MB of RAM. The 16-MHz Arche Pro-File 286 was configured with a 40MB hard disk and 3.7MB of RAM. The 10-MHz AST Premium/286 Workstation 243X was tested with a 20MB hard disk and 1MB of RAM. The 10-MHz IBM PS/2 Model 30 286 was tested with a 20MB hard disk and 1MB of RAM.

Microsoft Word 4.0

A Microsoft Word macro loads a 3.5-page, 140-paragraph document and performs search-and-replace and spell-checking operations. The first page of the document is then printed. Although the results of the benchmark depend primarily on processor and memory access speeds, display adapter and hard disk speeds are also contributing factors.

dBASE III Plus 1.1

The dBASE III Plus test measures the time required to prepare and print a report of past-due invoices. The report includes calculated fields and is based on three files: a 500-record customer file, a 1000-record invoice file, and a 2000-record item file. When disk caching is not used, the random access speed of the hard disk is, after processor speed, the most significant factor in this benchmark. With disk caching, sequential read performance becomes more important than random access.

Microsoft C

Arche Pro-File	497
Compaq Deskpro	565
AST Workstation	672
PS/2 Model 30 286	719

seconds 400 475 550 625 700 775

AutoCAD

Arche Pro-File	131
Compaq Deskpro	161
AST Workstation	176
PS/2 Model 30 286	189

seconds 0 40 80 120 160 200

1-2-3 2.01

In this benchmark, a 1-2-3 macro executes a series of recalculations using five different formulas within a 75-by-75-cell matrix. Because there are few screen updates and no screen access is required, the results depend almost entirely on processing and memory access speeds.

Microsoft C 5.0

The Microsoft C benchmark measures the time required to compile and link XUSP, a public-domain program composed of 25 C source code files. The most important factors in this benchmark are processor and memory access speeds. The performance of the hard disk is also a factor; generally, disk caching has little effect.

AutoCAD 9

In this benchmark, a three-dimensional sample drawing is retrieved and displayed using AutoCAD's EGA driver. The zoom function is used to display the drawing from various perspectives; then the full drawing is printed. The results of the benchmark depend primarily on the speeds at which the processor and coprocessor operate and at which memory is accessed. The performance of the display adapter and the hard disk also have some effect.

Data based on tests designed and conducted by National Software Testing Laboratories (NSTL). All rights reserved.

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VGA Color Display \$750, 16-inch 8514/
A Color Display \$1550; 512K RAM up-
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labor

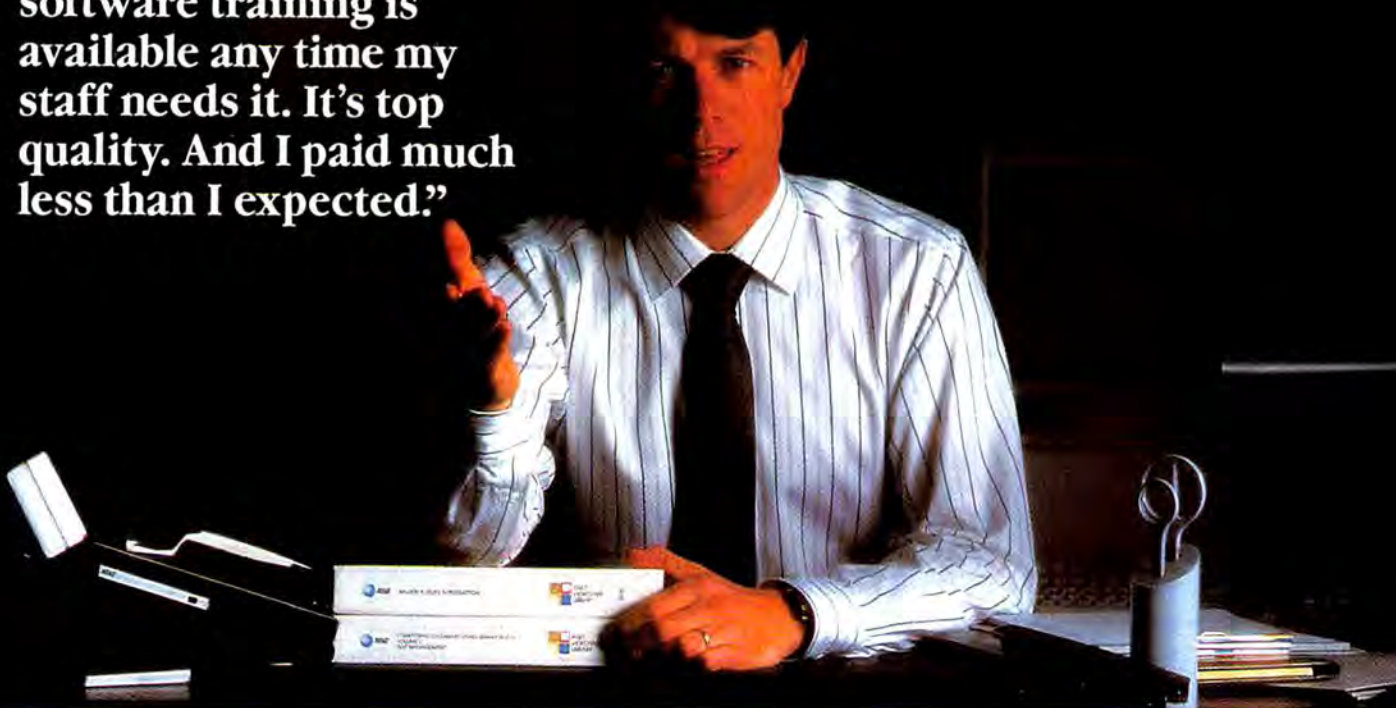
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AT&T

The right choice.

Arche Pro-File 286

AT-compatible system

PROS: Very fast, outstanding device expandability, supports up to 8MB CPU-speed RAM

CONS: No disk caching software, costly

With more and more 80286 systems running at 16 and even 20 MHz, many business users are finding it harder to justify shelling out the extra bucks for an 80386. The Arche Pro-File 286 tower is a perfect case in point. With its swift 16-MHz CPU and a 28ms hard disk, the Pro-File 286 not only outperforms most 286s, it can give more than one 80386 system a run for the money—especially on CPU-intensive benchmarks like *1-2-3* and *Microsoft Word*.

Configured with 1MB of RAM, a 1.2MB floppy drive, a 44MB Microscience hard disk, and an EGA board and monitor (VGA is not

The Arche Pro-File 286 is a fast, well-designed 16-MHz system whose full-speed memory bus holds a generous 8MB—but it's not cheap.



currently available), the Pro-File 286 lists for \$4330. Standard features include a ROM-based utility that allows you to install peripherals without setting motherboard jumpers, and support for up to 8MB of RAM accessible at full CPU speed.

No disk caching software comes with the Pro-File 286, but with the popular *PC-Kwik* disk caching program installed, Arche's machine clobbered the 12-MHz Compaq 286 (which costs \$1167 more) in every test. In fact, the Pro-File stuck impressively close to the 16-MHz Compaq Deskpro/386 (not shown) on *1-2-3*, *Microsoft Word*, and *dBASE III* benchmarks. Furthermore, it boasts impeccable software compatibility; it aced the NSTL Crash Test without a problem.

The Pro-File's motherboard holds up to 4MB of 100-nanosecond, 1-megabit DRAM chips. In addition, Arche provides an 8/16-bit slot with an extra connector that lets you access another 4MB of RAM (on a proprietary \$240 expansion board) at a full 16 MHz. If you prefer to use this slot for a conventional expansion board, the board will run at industry-standard 8 MHz.

The expansion bus also contains two conventional 8-bit and five conventional 8/16-bit slots. However, once you plug an Adaptec disk controller and an I/O board into two of the 8/16-bit slots and a display adapter into an 8-bit slot, you've got just five slots left open; use the special 16-MHz slot for memory expansion, and you're down to four. That's fine for a desktop unit, but only average for a tower.

Device expandability is outstanding, though. There are four externally accessible half-height bays—two for 5¼-inch floppy drives and two for 3½-inch drives—and additional space inside for two full-height 5¼-inch hard drives. There's even room for a third full-height hard drive just below the 275-watt power supply.

The Pro-File's ergonomics are excellent. Indicators and power and reset switches are conveniently located on a front panel near the top of the tower. A large digital readout located next to the on/off switch prominently

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AUTOCAD — Autodesk Inc.; WINDOWS — Microsoft Inc.; GEM — Digital Research Inc.;
VENTURA — Xerox Corp.; HERCULES — Hercules Computer Technology Inc.;
IBM, VGA, EGA, CGA — International Business Machines Corp.



displays the CPU speed, which is switchable between 16 and 8 MHz.

The little touches are all well done. Setup and configuration are easy thanks to an unusual ROM-based, switchless installation utility. You also get a hardware memory controller that can turn RAM above 1MB into EMS 4.0 memory. DOS 3.3 and GW BASIC come free.

The Pro-File 286 is one of the best 80286 systems we've looked at. Features like switchless setup, built-in EMS 4.0 support, and an 8MB high-speed-memory capacity make it unique—and its 16-MHz CPU makes it one of the hottest AT compatibles we've ever tested. True, it's not cheap. You can buy a lowball 80386 clone, such as the 20-MHz Micro 1 Tower (see *The Hardware Shelf*, *PCW*, November 1988), for \$600 less—and get the ability to run programs like *Windows/386*. But the Arche is obviously a cut above the usual low-end bargain, and intangibles like reliability and good engineering can be worth more than a few dollars saved.

—TJ Byers

WHERE TO BUY

Arche Pro-File 286

Arche Technologies Inc.
48881 Kato Rd.
Fremont, CA 94539
415/683-6760

List price: with 1MB RAM, 1.2MB 5¼-inch floppy drive, parallel port, two serial ports, 14-inch monochrome monitor and adapter, 101-key keyboard \$2995; with EGA monitor and adapter, 28ms 44MB Microscience hard disk \$4330

Accessories: 28ms 122MB Microscience ESDI hard disk \$1645, 720K floppy drive \$179, 1.44MB floppy drive \$199, 360K floppy drive \$139, 1.2MB floppy drive \$149; unpopulated zero-wait-state memory expansion adapter \$240; EGA and 14-inch color monitor \$600

Warranty: two years parts and labor
Extended warranty: none

Technical support: toll-free number, M-F 7-6

Other support services: none
For more information, circle 691 on reader service card.

Hewlett-Packard LaserJet IID

Laser printer

PROS: Prints on both sides of paper, 400-sheet capacity

CONS: Big, heavy, expensive

For several years, Hewlett-Packard's LaserJet Series II has been the printer of choice in the business market. Now HP has released the LaserJet IID, a powerhouse designed for high-end, heavy-duty office applications. The 8-page-per-minute (ppm) LaserJet IID retains the handiest features of the Series II—the convenient toner cartridge, the easy-to-use front control panel, the painless paper path, the twin font-cartridge slots. The IID adds duplex (two-sided) printing and an optional envelope feeder, doubles the II's 200-sheet paper tray capacity, raises the monthly usage limit from 12,000 to 16,000 pages, and augments the II's six internal fonts with eight additional built-in fonts and ten more included on a Times/Helvetica font cartridge.

The new machine is not cheap; it costs a cool \$4295, compared with \$2695 for the II and \$3799 for Toshiba's 12-ppm PageLaser 12. And its bulk and weight make it hard to move. But the IID's duplex capability and envelope-feeding option will be welcome features at most offices.

The duplex capability lets you print documents using half the number of sheets. The feature works flawlessly, although it slows throughput and causes the printer to emit alarming clanks. However, no current word processors support duplex printing directly; you must turn it on via the front panel or an escape sequence.

Unfortunately, the complicated duplex paper path requires an oversize housing. The IID is about twice as large as the II and, at 74 pounds, weighs nearly twice as much. Moving it to another desk, let alone another office, is a major operation.

The optional envelope feeder (\$350) attaches in about 15 seconds. It works fairly well but, again, cannot be accessed directly

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NSTL TEST REPORT

HP LaserJet IID Aces Out Toshiba PageLaser 12

Hewlett-Packard's LaserJet IID is rated at only 8 pages per minute, but it whips the 12-ppm PageLaser 12 on graphics printing and on NSTL's combination of text and graphics. It trails the PageLaser on text printing with an HPLaser1 driver, but only by a few seconds.

Plain text, TTY driver

Toshiba PageLaser 12	107
HP LaserJet IID	160

Plain text, HPLaser1 driver

Toshiba PageLaser 12	156
HP LaserJet IID	160

seconds 0 35 70 105 140 175

Graphics

HP LaserJet IID	39
Toshiba PageLaser 12	66

seconds 0 15 30 45 60 75

Text and graphics

HP LaserJet IID	248
Toshiba PageLaser 12	575

seconds 0 120 240 360 480 600

Benchmarks were conducted using a 12-MHz Compaq Deskpro 286 Model 40 equipped with 1.2MB of RAM. Text printing speed was tested using a typical business document created with *Microsoft Word 4.0*. Graphics printing speed was tested using a 1-2-3 graph. *PageMaker* version 1.0a was used to test the printers' ability to produce text and graphics on the same page. Timing began when the command to print was issued and ended when the last page came to rest in the output tray.

Plain text, TTY driver

This benchmark timed the printing of 20 pages of plain text without enhancements or formatting using *Word's* TTY printer driver.

Plain text, HPLaser1 driver

This benchmark timed the printing of the same 20 pages of plain text using *Word's* HPLaser1 printer driver.

Graphics

This benchmark timed the printing of a 1-2-3 stacked bar chart using the Hewlett-Packard LaserJet Plus driver with the high-density option.

Text and graphics

This benchmark timed the printing of an 8-page newsletter containing text and graphics—various type sizes and fonts, a scanned photo, and a line drawing—using the HP Series II printer driver.

Data based on tests designed and conducted by National Software Testing Laboratories (NSTL). All rights reserved.

by any current word processor; you have to use the control panel or an escape sequence.

NSTL tests prove the 8-ppm-rated IID to be a speed demon. It even beat Toshiba's 12-ppm PageLaser 12 on graphics and text-and-graphics benchmarks and trailed the PageLaser by only a few seconds on plain text printed with an HPLaser1 driver. The tests turned up no software incompatibilities, although it was not possible to use duplex with *PageMaker*.

The IID comes with 640K of built-in memory—128K more than the II, but still not enough for a full page of bit-mapped graphics. The printer has room for up to 4MB of additional RAM.

Toshiba's PageLaser 12 costs \$500 less and offers an optional envelope feeder. But the IID's extra features outweigh the PageLaser's cost advantages. If you want a heavy-duty print engine, lots of fonts, duplex printing, and LaserJet reliability, there's only one choice: Hewlett-Packard, the winner and still champion. —M. G.

WHERE TO BUY

Hewlett-Packard LaserJet IID

Hewlett-Packard Co.
19310 Pruneridge Ave.
Cupertino, CA 95014

Call HP sales office listed in telephone directory white pages

List price: \$4295

Accessories: envelope feeder \$350; EP toner cartridge \$125; font cartridges \$150–\$330; soft fonts \$200; paper tray \$69; 1MB memory board \$595, 2MB memory board \$1195, 4MB memory board \$2295

Warranty: one year parts and labor

Extended warranty: yes

Technical support: no toll-free number, M–F 7–6

Other support: third-party newsletter

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Intel 2400B Modem 2

2400-bps PS/2 internal modem

PROS: Excellent Hayes compatibility, five-year warranty

CONS: Slightly more sensitive to phase and amplitude jitter than Hayes 2400

MultiTech MT224ES

2400-bps PS/2 internal modem

PROS: Hardware-based error correction and data compression, includes ProComm software

CONS: Not fully Hayes compatible

Despite its efforts to put everything but the kitchen sink on the PS/2 motherboard, IBM forgot a modem. Among the many internal modems now appearing to fill the gap are

two standouts: the \$445 Intel 2400B and the \$549 MultiTech MT224ES.

Both are more or less Hayes compatible, run at 2400 bps, and use the PS/2's speaker for audio output. But that's where the similarities end. The 2400B is a plain-vanilla modem with basic features and provides neither bundled software nor on-line freebies. The MT224ES, on the other hand, is loaded with extra features.

The MT224ES is, among other things, the first PS/2 modem to offer hardware-based MNP class 5 error correction and data compression. Used together, the techniques can boost the MT224ES's throughput to 4800 bps, provided the modem at the other end of the line also supports MNP class 5. Of course, you pay for the power. The MT224ES runs \$100 more than the 2400B.

The MT224ES includes a version of the popular *ProComm* communications package customized to access the modem's hardware-based protocol features. You also get discount coupons worth over \$400 in registration fees and on-line connect time.

While both modems support the Hayes AT command set, the 2400B does a better job, implementing all but one unimportant AT command. The MT224ES lacks support for 9 AT commands. To compensate, it provides 25 proprietary commands, most of which are related to its hardware-based protocols.

When it comes to assessing the Micro Channel's extended set of serial ports, the Intel 2400B wins hands down. While the MT224ES is limited to dialing out via COM1 through COM4, you can configure the 2400B to access COM1 through COM7 and thereby use a much wider range of serial port devices.

NSTL tests show the 2400B and MT224ES equal the Hayes Smartmodem 2400P in both software compatibility and performance. The Intel is a bit more sensitive to phase and amplitude jitter than the other two, but under normal conditions you'd never notice.

Choosing between the two modems is not easy. While the MT224ES's MNP capability, free software, and on-line discounts make a compelling package, its lack of full Hayes

FEATURES EVALUATION

Full-Featured 2400-bps Modems: Two Winners

The MultiTech MT224ES costs about \$100 more than Intel's 2400B but offers MNP hardware-based error correction and data compression. On the other hand, the 2400B boasts better Hayes compatibility.

	MultiTech MT224ES	Intel 2400B Modem 2	Hayes Smartmodem 2400P
Price	\$549	\$445	\$549
Switchless installation	●	●	●
Error correction	●	○	○
Data compression	●	○	○
Speaker volume knob	●	○	○
Phone number storage	●	●	●
Serial ports supported	4	7	6
Communications software included	●	○	●
On-line discounts included	●	○	●
Hayes compatibility	◐ ¹	●	●
Warranty (years)	2	5	2

¹ Fails to support nine AT commands.

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PC Connection Software Special

through March 31, 1989

Chipsoft ... NCP

- Turbo Tax Personal/1040

Turbo Tax, the award winning tax preparation software from Chipsoft, has been making filing your tax return fast and easy for the past five years. And this year's version is no exception. Included are over 40 forms, schedules, and worksheets, as well as an optional Visual 1040 mode.

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- TurboTax Proseries/1040 5.0 229.
- Chronos Software ... NCP**
- Who•What•When (people, projects, time) 119.
- Computer Associates ... NCP**
- SuperCalc 5 1.0 319.
- Core International ... NCP**
- Corefast 2.0 95.
- Crosstalk Communications ... NCP**
- Remote 1.01 \$95.
- Crosstalk XVI 3.7 95.
- Crosstalk MK.4 1.1 124.
- Dac Software ... NCP**
- Dac-Easy Payroll 3.0 59.
- Dac-Easy Light 1.0 45.
- Dac-Easy Accounting 3.0 59.
- Delrina Technology ... NCP**
- Per:FORM 1.0 159.
- Digital Research ... NCP**
- Gem Desktop 3.0 35.
- Gem Draw Plus 2.01 189.
- 5th Generation ... NCP**
- Fastback Plus 2.01 109.
- Fox Software ... NCP**
- Foxbase Plus 2.1 (single user) 209.
- Foxbase Plus 386 2.1 319.
- Funk Software ... NCP**
- Sideways 3.21 (creates wide printouts) 42.
- Worksheet Utilities 1.0 (1-2-3 utilities) 59.
- Inword 1.0 59.
- Allways 1.0 89.
- Noteworthy 1.0 49.
- General Information ... NCP**
- Hot Line Two 2.0 49.
- Generic Software ... NCP**
- Generic CADD Level 1 35.
- Generic CADD Level 2 55.
- Generic CADD Level 3 (now includes Dot Plot) 135.
- 3D Solids 2.2 189.
- Estimator 159.
- Basic Home Design 3.0 35.
- CADD Starter Kit (contains Level 2, Home Design, Workbook tutorial, & sample disk) 89.
- Harvard Associates ... NCP**
- PC Logo 3.0 59.
- Hayes ... NCP**
- Smartcom II 3.0 89.
- Hilgraeve Software ... NCP**
- HyperACCESS 3.31 89.
- Individual Software ... NCP**
- Typing Instructor Encore 2.13 26.
- Professor DOS 2.51 (with Smartguide) 33.
- 101 Macros for 1-2-3, WordPerfect, and others each 42.
- Intuit ... NCP**
- Quicken 2.0 35.
- Javelin ... NCP**
- Javelin Plus 2.02 249.
- Lotus ... NCP**
- Agenda 1.0 289.
- 1-2-3 2.01 (upgrade free to version 3.0) call
- Freelance Plus 3.0 call
- Symphony 2.0 call
- Manuscript 2.0 359.

For IBM Personal Computers exclusively.

PC CONNECTION®

If he'd had good projections

*They couldn't cut him down
For before the cock crowed
He'd have been out of town.*

MECA ... NCP

- Checkwrite Plus 1.0 \$29.
- Financial Calculator 1.0 33.
- Managing Your Money 5.0 119.
- Andrew Tobias' Tax Cut 1040 49.

Meridian Technology ... NCP

- CarbonCopy Plus 5.0 115.

Micro Logic ... NCP

- Tornado 1.8 55.

Microlytics ... NCP

- GOfer 1.0 (text retrieval system) 45.
- Wordfinder 4.0 (electronic thesaurus) special

MicroPro ... NCP

- WordStar Professional Release 5 259.
- WordStar 2000 Plus Rel. 3 (Personal Ed.) 259.

Microrim ... NCP

- R:BASE for DOS (version 2.1) 449.
- R:Base for OS/2 599.

Microsoft ... NCP

- Learning DOS 2.0 (for any DOS version) 35.
- Windows 286 2.1 69.
- Windows 286 2.1 w/Mouse 145.
- Works 1.05 99.
- Windows 386 2.1 129.
- Word 5.0 call
- Chart 3.0 259.
- Excel 2.1 (requires 80286/80386 CPU) 239.

CD-ROM

- Bookshelf 1.0 w/Amdek Laser Drive 799.
- Programmers Library 1.0 269.

LANGUAGES

- Quick BASIC 4.5 69.
- Quick C 2.0 69.
- Macro Assembler 5.1 99.
- Basic Compiler 6.0 199.
- Pascal 4.0 199.
- Fortan 4.1 289.
- C Compiler 5.1 299.
- Cobol 3.0 599.

Monogram ... NCP

- Dollars and Sense 3.1 105.

Nantucket Software ... NCP

- Clipper (Summer '87, dB3 Plus compiler) 429.

New England Software ... NCP

- Graph-in-the-Box Release 2 75.
- GB-Stat 1.0 159.
- GB Analytic 1.0 105.

Nolo Press ... NCP

- WillMaker 3.0 35.

North Edge Software ... NCP

- Timeslips III 3.3 119.

Owl International ... NCP

- Guide 2.0 143.

Paperback Software ... NCP

- VP-Info 1.4 65.
- VP-Planner Plus 2.0 145.
- VP-Expert 2.0 145.

PC Connection Software Special

through March 31, 1989

Software Publishing ... NCP

- Harvard Graphics 2.12
- Harvard Graphics Accessories Master Pack

Show off your own custom reports, overhead transparencies, slides, or any on-screen presentation with Software Publishing's Harvard Graphics. Some of its capabilities include:

- Creating your own charts from scratch or choosing one that's pre-formatted
- Reading 1-2-3 graphs and data or any ASCII file
- Incorporating symbols, drawings, etc., from the Harvard Graphics Accessories Master Pack (including Business Symbols, Designer Gallery, Map Maker, Quickchart, and Screenshow)

Harvard Graphics 2.12 (3 1/2" included) \$289.
Harvard Graphics Accessories Master Pack (3 1/2" included) 289.

Paul Mace ... NCP

- H/Test-H/Format 2.0 (hard-disk tools) \$49.
- Mace Utilities 5.0 (DOS utilities) 55.
- Mace Gold 1.0 79.
- Grasp 3.1 79.
- Nvelope 1.02 29.

PC Support Group ... NCP

- Lightning 4.82 39.
- Lucid 3-D 1.22 75.

Personics ... NCP

- SmartNotes 2.0 49.
- SeeMORE 1.02 49.
- Look&Link 1.01 59.
- Ultravision 1.1 79.
- @BASE 1.21 119.

Peter Norton ... NCP

- Norton Editor 1.3 39.
- Norton Commander 2.0 45.
- Advanced Utilities 4.5 79.
- Dan Bricklin's Demo Program 2 99.

1-800/243-8088



PC Connection 580W
6 Mill Street
Marlow, NH 03456

SALES 603/446-7721 FAX 603/446-7791

Quarterdeck ... NCP

- Expanded Memory Manager 4.2 \$39.
- DESQView 2.2 79.
- DESQView 386 1.0 115.

Reference Software ... NCP

- Grammatik III 1.06 (electronic proofreader) 52.
- Reference File 1.0 (pop-up DB manager) 49.

Relay Communications

- Relay Gold 3.0 149.

Revolution Software ... NCP

- VGA Dimmer 2.01 (screen saver) 19.
- DJ 1.5 (disk manager) 39.
- Cruise Control 3.02 39.

Rightsoft ... NCP

- Rightwriter 3.0 54.

Simon & Schuster ... NCP

- Professional Thesaurus 1.0 79.
- Typing Tutor IV 33.

Softlogic Solutions ... NCP

- Software Carousel 2.02 49.
- Disk Optimizer 4.01 (w/Data Guardian) 45.
- @Liberty 1.1 119.
- Cubit 2.02 45.
- Double DOS 4.02 45.
- Magic Mirror 1.0 59.

SoftView ... NCP

- TaxView (for 1988 taxes) 69.

Software Publishing ... NCP

- Professional Plan 1.01 59.
- PFS:First Publisher 2.0 79.
- PFS:First Graphics 1.0 95.
- PFS:First Choice 3.01 99.
- Professional Write 2.0 125.
- Professional File 2.0 189.
- Office Writer 6.0 259.
- Harvard Graphics 2.12 special
- Harvard Graphics Accessories Pack special
- Harvard Project Manager 3.0 439.

Spinnaker ... NCP

- Resume Kit 1.0 25.
- Eight-in-One 1.1 39.
- Splash 1.0 59.
- Pinstripe Presenter 1.0 115.

Springboard ... NCP

- Newsroom Pro 1.0 45.
- Certificate Maker 34.
- Clip Art 1 or 3 each 19.
- Clip Art 2 25.
- Clip Art 3 19.

Symantec ... NCP

- SQZ!Plus 1.11 69.
- 4Word 2.0 69.
- Q & A Write 1.01 135.
- Grandview 1.0 195.
- Q & A 3.0 (database, word processor) 235.
- Breakthrough Timeline 3.0 395.
- Spreadsheet Analyst 2.5 99.

For IBM Personal Computers exclusively.



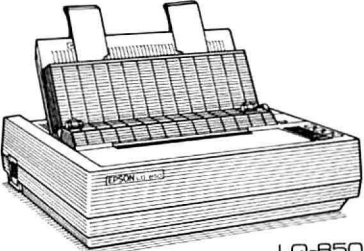
ALL ITEMS SUBJECT TO AVAILABILITY. PRICES SUBJECT TO CHANGE WITHOUT NOTICE.

He'd have studied their looks

*So hungry and lean
And with a good database
Would know what they mean.*

<input type="checkbox"/> Note-It Plus 1.02	\$55.
<input type="checkbox"/> Think Tank 2.4NP	135.
T/Maker ... NCP	
<input type="checkbox"/> Scrapbook+ 1.0	79.
<input type="checkbox"/> ClickArt Business Images	42.
<input type="checkbox"/> ClickArt Holidays	42.
<input type="checkbox"/> EPS (PostScript) Illustrations	79.
The XTREE Co. ... NCP	
<input type="checkbox"/> XTREE Pro 1.0	69.
<input type="checkbox"/> Hot 4.0	95.
TOPS ... NCP	
Flashcard (AppleTalk network card; 1 year warranty)	
	169.
NetPrint 2.0 (share printers)	
	119.
TOPS 2.0	
	119.
TOPS Repeater (extends network)	
	132.
Traveling Software ... NCP	
Battery Watch 1.0 (3 1/2" only)	
	27.
<input type="checkbox"/> Laplink Mac 2.0 (Mac-PC transfer)	79.
<input type="checkbox"/> Laplink Plus 2.1	85.
<input type="checkbox"/> Desklink 2.21	99.
True BASIC, Inc. ... NCP	
<input type="checkbox"/> True BASIC 2.03 (now includes Runtime)	57.
<input type="checkbox"/> 3-D Graphics	45.
Vericomp ... NCP	
<input type="checkbox"/> SoftBytes 2.0	35.
WordPerfect Corp. ... NCP	
<input type="checkbox"/> WordPerfect Library 2.0	69.
<input type="checkbox"/> WordPerfect 5.0	239.
<input type="checkbox"/> WordPerfect 5.0 Addit'l Network Stations	84.
<input type="checkbox"/> WordPerfect Office 2.0	269.
<input type="checkbox"/> WordPerfect Office 1.0 Addit'l Network Stations	84.
<input type="checkbox"/> WordPerfect Network Server 5.0	349.
<input type="checkbox"/> WordPerfect Executive	129.
<input type="checkbox"/> DataPerfect 1.0	299.
Wordtech ... NCP	
<input type="checkbox"/> DBXL 1.2	119.
Xerox ... NCP	
<input type="checkbox"/> Ventura Publisher 2.0	call
Professional Extensions (reqs. Ventura Publisher)	
	call
XYQUEST ... NCP	
<input type="checkbox"/> XyWrite III Plus 3.54 w/A-la-Carte Menus	239.
<input type="checkbox"/> XyWrite III Plus Network Server 3.54	399.
RECREATIONAL/EDUCATIONAL	
Accolade ... CP (reqs. graphics brd.)	
<input type="checkbox"/> Bubble Ghost	22.
<input type="checkbox"/> Mean 18	29.
<input type="checkbox"/> Hardball (baseball simulation)	11.
<input type="checkbox"/> Testdrive (driving simulation)	24.
<input type="checkbox"/> Jack Nicklaus' 18 Greatest Holes	29.
<input type="checkbox"/> Grand Prix	22.
<input type="checkbox"/> 4th & Inches (football simulation)	22.
Broderbund ... CP	
<input type="checkbox"/> Where in the World is Carmen SanDiego?	25.

**PC Connection
Hardware Special**
through March 31, 1989



LQ-850

**Epson ... 1 year
Epson LQ-850**

- 80 column printer with print speeds of 264 cps draft and 88 cps letter quality (12 cpi mode)
- SelectType control panel offers quick, easy selection of typesyles, font, and pitch
- Includes both parallel and serial interfaces, 6k buffer, and push tractor
- Full 1 year limited warranty

Epson LQ-850..... call

<input type="checkbox"/> Where in the USA is Carmen SanDiego?	\$25.
<input type="checkbox"/> Where in Europe is Carmen SanDiego?	29.
<input type="checkbox"/> Toy Shop	39.
<input type="checkbox"/> Ultima IV	35.
<input type="checkbox"/> Ultima V	39.
Electronic Arts ... CP (reqs. graphics brd.)	
<input type="checkbox"/> One-on-One/Bird vs Jordan	29.
<input type="checkbox"/> Chuck Yeager's Flight Trainer	32.
<input type="checkbox"/> Chessmaster 2100	32.
<input type="checkbox"/> Earl Weaver Baseball	32.
<input type="checkbox"/> Heroes of the Lance	29.
<input type="checkbox"/> Empire	35.
<input type="checkbox"/> Mavis Beacon Teaches Typing	35.
<input type="checkbox"/> Sentinel Worlds	39.
<input type="checkbox"/> Bard's Tale II	39.
<input type="checkbox"/> Grand Slam Bridge	45.
Infocom ... NCP	
<input type="checkbox"/> Zork Trilogy	33.
Microprose ... CP	
<input type="checkbox"/> F-19 Stealth Fighter (requires CGA or EGA)	39.
<input type="checkbox"/> F-15 Strike Eagle (requires CGA)	22.
<input type="checkbox"/> Gunship (requires CGA or EGA)	32.
Microsoft ... NCP	
<input type="checkbox"/> Flight Simulator 3.0 (reqs. graphics brd.)	35.
Mindscape ... CP	
<input type="checkbox"/> Colony 1.0	30.
<input type="checkbox"/> Balance of Power	33.
<input type="checkbox"/> Balance of Power 1990	30.

One Step Software ... NCP	
<input type="checkbox"/> Golf Doctor 1.1 (improve your game)	\$33.
<input type="checkbox"/> Golf's Best Pinehurst #2 4.0 (play the best)	12.
<input type="checkbox"/> Golf Statkeeper 1.0 (includes USGA Handicapper)	
	27.
<input type="checkbox"/> 19th Hole Special (3 Golf programs above bundled with Mr. Boston Micro Bartender's Guide)	
	79.
<input type="checkbox"/> Mr. Boston Official Micro Bartender's Guide	18.
<input type="checkbox"/> Micro Video Companion 1.0	24.
<input type="checkbox"/> Take Control of Cholesterol 2.0	24.
Parlor Software ... CP	
<input type="checkbox"/> Bridge Parlor 2.3	49.
Sierra On-Line ... CP (All require Hercules, CGA or EGA)	
<input type="checkbox"/> Leisure Suit Larry	25.
<input type="checkbox"/> Leisure Suit Larry II	33.
<input type="checkbox"/> Space Quest II	33.
<input type="checkbox"/> King's Quest IV (512k version)	33.
<input type="checkbox"/> Manhunter	33.
<input type="checkbox"/> Police Quest	33.
<input type="checkbox"/> Police Quest II	33.
<input type="checkbox"/> 3D Helicopter	33.
Simon & Schuster	
<input type="checkbox"/> Star Trek: Rebel Universe	29.
Spectrum Holobyte ... NCP	
<input type="checkbox"/> Orbiter (shuttle simulation)	25.
<input type="checkbox"/> GATO (submarine simulation)	12.
<input type="checkbox"/> Tetris (addicting mind teaser)	24.
<input type="checkbox"/> Falcon (F-16 simulation, reqs. graphics brd.)	32.
Spinnaker ... CP	
<input type="checkbox"/> Sargon III (chess game)	15.
<input type="checkbox"/> Kids on Keys (ages 3 to 9)	19.
<input type="checkbox"/> Facemaker Gold (ages 3 to 8)	25.
<input type="checkbox"/> Kindercomp Gold (ages 3 to 8)	25.
<input type="checkbox"/> Kidwriter Gold (ages 6 to 10)	32.
<input type="checkbox"/> Homework Helper—Math (grades 7-12)	32.
<input type="checkbox"/> Homework Helper—Writing (grades 7-12)	32.
Stone & Assoc. ... NCP (reqs. graph. brd.)	
<input type="checkbox"/> Algebra Plus (ages 13 to adult)	27.
<input type="checkbox"/> Memory Master (ages 2 to 6)	22.
<input type="checkbox"/> My Letters, Numbers, Words (2 to 6)	22.
<input type="checkbox"/> Second Math (ages 7 to 16)	27.
Sublogic ... NCP	
<input type="checkbox"/> Jet 2.1 (requires EGA or CGA)	33.
<input type="checkbox"/> Scenery Disks	each 15.
<input type="checkbox"/> San Francisco Star Scenery Disk	18.
<input type="checkbox"/> Japan Scenery Disk	15.
<input type="checkbox"/> Up Periscope	19.
The Learning Company ... CP	
<input type="checkbox"/> Math Rabbit (ages 4 to 7)	26.
<input type="checkbox"/> Reader Rabbit (ages 4 to 7)	26.
<input type="checkbox"/> Writer Rabbit (ages 6 to 12)	26.
True BASIC, Inc. ... NCP	
<input type="checkbox"/> Kemeny/Kurtz Math Series	32.
XOR ... NCP	
<input type="checkbox"/> NFL Challenge 2.0	69.

For IBM Personal Computers exclusively.

PC CONNECTION®



PC Carnival.

Revel without a Claus.

In the festive town of Marlow, NH (pop. 557), the holiday spirit lasts long after Santa's packed it in for the year. In fact our sure-pawed mascots are already preparing for their annual Winter Carnival – a seasonal celebration featuring skating, sledding, sleigh rides and ice sculpture. This annual event certainly provides a welcome break from our usual winter sports, e.g. thawing frozen pipes, jump starting cars, putting out chimney fires, and skidding off the road into ten foot snow drifts.

Breaking the mold.

(Or, where's the P word?)

Our more loyal and linguistically-inclined customers may have noticed that we've abandoned the "P" words in our headlines in favor of the "C" words. Because after five years of parading a profusion of P patter past PC pros on periodical pages, we perceived that perhaps they paled next to the possibilities and potential

of creative constructions consisting of C words. 'Nough said. Rest assured, though, our letter-perfect mascots still stand (and occasionally sit, roll over, and do handstands) for everything true and noble in the microcomputer mail order marketplace. If you're looking for a single source for superior savings, sensational tech support, and specially speedy shipping, we're definitely your Connection.

The ice mammal cometh.

Wouldn't you like to wake up every morning to a vision of microcomputing's most magnificent mammal? Well, now you can do that *and* quench your thirst for a taste of Marlow's winter wonderland with your very own PC Connection mug. It features a crystal-clear likeness of our oh-so-cool, but heartwarming mascot, and is free to anyone who places an order of \$500 or more between now and March 31st.

Just call 1-800/243-8088 or 1-603/446-3383, M-F 9:00 to 9:00; Saturday to 5:30. If you're planning to visit please call ahead.



Warm the cockles of your heart with a PC Connection mug featuring the mascot who never skates on thin ice. Offer not available to net accounts. One per customer.

For IBM Personal Computers exclusively.

PC CONNECTION®

For Caesar and the others

*Are probably pledgin'
That the next time they'll consult
With PC Connection.*

PC Mouse II w/PC Paint+ (bus or serial) . . .	\$89.
PC Mouse II w/Autosketch (bus or serial) . . .	105.
NEC ... 2 years	
Multisync II (800 x 560 max. resolution) . . .	599.
NSI Logic ... 1 year	
Smart VGA (supports full VGA specs)	239.
Orchid Technologies ... 2 years	
Tiny Turbo 286 (accelerator board)	289.
ProDesigner VGA (800x600 VGA Mode)	319.
RAMquest Xtra 16/32 □	339.
PC Power & Cooling Systems ... 1 year	
REPLACEMENT POWER SUPPLIES	
Turbo Cool 150 (run 25° - 40° cooler)	129.
Turbo Cool 250 (run 25° - 30° cooler)	169.
Silencer 150 (84% noise reduction)	115.
Silencer 200 (69% noise reduction)	149.
Turbo Cool 375	299.
PC Support Group ... 1 year	
Breakthrough 286 Accel. Board (8 MHz)	299.
Breakthrough 286 Accel. Board (12 MHz)	449.
Practical Peripherals ... 5 years	
1200 Baud Internal Modem (w/ProComm)	69.
1200 Baud External Modem (mini)	79.
Microbuffer Inline (par. print buffer/32k)	135.
2400 Baud Internal Modem	159.
2400 Baud External Modem	189.
Princeton Graphics ... 1 year	
Ultrasync (supports CGA, EGA, VGA)	549.
Max15 Monochrome Monitor	269.
Safe Power Systems ... 2 years	
Safe 250W (standby power backup)	249.
Safe 425W (standby power backup)	369.
Toshiba ... 1 year	
P321SL printer (80 col., 216 cps, w/tractor)	529.
T1000 Laptop (80C88, 6.4 lbs., 5 hr. battery)	call
T1200 Laptop (80C86, 10 MHz, 20 Meg)	call
T1200HB Laptop w/Backlit screen	call
T1200FB Laptop Dual Floppy System w/Backlit screen	call
T3200 Laptop (80286, 12 MHz, 40 Meg)	call
T5100 (80386, 16 MHz, 40 Meg)	call
768k RAM Card for T1000	299.
Video 7 ... 5 years	
VEGA Deluxe (supports 640x480)	219.
VEGA VGA (supports full VGA specs)	287.
FastWrite VGA (800x600 max. resolution)	379.
VRAM VGA (1024x768 max. resolution)	529.

DRIVES

Alloy ... 1 year	
Tape System/2 (for PS/2 MicroChannel)	299.
Retriever/40 (for IBM AT & compatibles)	349.
IOMEGA ... 1 year	
Dual 20 Meg Bernoulli Box (8")	1679.

20 Meg Cartridge (8")	\$82.
20 Meg Tripak (8")	244.
Bernoulli II Single 20 Meg Internal (5 1/4")	767.
Bernoulli II Dual 20 Meg External (5 1/4")	1659.
20 Meg Cartridge (5 1/4")	59.
20 Meg Tripak (5 1/4")	169.
PC2 Card	169.
PC2B Card (bootable card for PC/XT/AT)	229.
PC4 Card (for PS/2 Model 50/60/70/80)	299.
Mountain Computer ... 1 year	
40 Meg Internal Tape Drive (XT, AT or PS/2) 379.	
40 Meg External Tape Drive (XT, AT or PS/2)	479.
40 Meg External Tape Drive w/Power Supply (XT, AT, or PS/2)	569.
Plus Development ... 2 years	
Hardcard 20 Meg (49 ms)	549.
Hardcard 40 Meg (28 ms)	699.
Passport (20 or 40 Meg removable drives)	call
Seagate ... 1 year	
FREE PCTV® Hard Drive Installation Tape with the purchase of 20, 30 or 40 Meg Seagate drive for the IBM PC (not for AT). Specify Beta or VHS.	
20 Meg Internal Hard Drive ST225 (w/controller and cables, 65 ms)	299.
30 Meg Internal Hard Drive ST238 (w/controller and cables, 65 ms)	329.
40 Meg Internal HD ST251 for AT (40 ms)	399.
40 Meg Internal HD ST251 for XT (w/controller and cables, 40 ms)	449.
40 Meg Internal HD ST251-1 for AT (28 ms)	449.
80 Meg Internal HD ST4096 for AT (28 ms)	669.
TEAC ... 1 year	
PC, XT 360k Drive (5 1/4" half-height)	89.
720k Drive (3 1/2" half-height, specify XT or AT)	95.
1.44 Meg Drive for AT (3 1/2" half-height, includes Bastech software utilities)	119.
Toshiba ... 1 year	
AT 360k Drive (5 1/4" half-height)	89.
AT 1.2 Meg Drive (5 1/4" half-height)	99.
AT 1.44 Meg Drive (3 1/2" half-height, includes Bastech software utilities)	119.

DISKS

All disks have a lifetime warranty.	
5 1/4" DS/DD Disks for PC & XT (360k)	
Fuji MD2D (10 disks per box)	12.
Sony (10 disks per box)	12.
Maxell MD2-D (10 disks per box)	13.
Verbatim Datalife (10 disks per box)	13.
5 1/4" DS/High Density Disks for AT (1.2 Meg)	
Fuji MD2HD (10 disks per box)	22.

Sony (10 disks per box)	\$23.
Maxell MD2-HD (10 disks per box)	23.
Verbatim Datalife (10 disks per box)	22.
3 1/2" DS/DD Diskettes (720k)	
Sony (10 disks per box)	19.
Fuji (10 disks per box)	19.
Verbatim (10 disks per box)	19.
Maxell (10 disks per box)	20.
3 1/2" DS/High-Density Diskettes (1.44 Meg)	
Sony (10 disks per box)	55.
Fuji (10 disks per box)	55.
Verbatim (10 disks per box)	55.
Maxell (10 disks per box)	59.

MISCELLANEOUS

CompuServe	
CompuServe Information Service	24.
Grolier's OnLine Encyclopedia	19.
Cables ... lifetime	
Smartmodem-to-AT cable (9 feet)	15.
Parallel Printer cable (15 feet)	19.

OUR POLICY

- We accept VISA and MASTERCARD only.
- No surcharge added for credit card orders.
- Your card is not charged until we ship.
- If we must ship a partial order, we never charge freight on the shipment(s) that complete the order (in the U.S.).
- No sales tax.
- All U.S. shipments insured; no additional charge.
- APO/FPO orders shipped 1st Class Mail, charged by weight.
- Allow 1 week for personal and company checks to clear.
- COD max. \$1000. Cash, cashier's check, or money order.
- 120 day limited warranty on all products.*
- To order, call us Monday through Friday 9:00 to 9:00, or Saturday 9:00 to 5:30. You can call our business offices at 603/446-3383 Monday through Friday 9:00 to 5:30.

SHIPPING

Note: Accounts on net terms pay actual shipping.

Continental US:

- For monitors, printers, Bernoulli Boxes, computers, and hard drives, pay actual charges. Call for UPS 2nd-Day & Next-Day-Air.
- For all other items, add \$3 per order to cover UPS Shipping. For such items, we automatically use UPS 2nd-Day-Air at no extra charge if you are more than 2 days from us by UPS ground.

Hawaii:

- For monitors, printers, Bernoulli Boxes, and computers, actual UPS Blue charge will be added. For all other items, add \$3 per order.

Alaska and outside Continental US:

- Call 603/446-3383 for information.

For IBM Personal Computers exclusively.



E tu compute

Can you see what's in view?
Just lend us your ears
And we'll help see you through.

HARDWARE

Manufacturer's standard limited warranty period for items shown is listed after each company name. Some products in their line may have different warranty periods.

AST Research ... 2 years

I/O Mini 2 C/S/P	\$89.
SixPakPlus 64k C/S/P (upgrades to 576k)	129.
Advantage Premium 512k S/P (upgrades to 1 Meg or 2 Meg w/Piggyback)	369.
Advantage 2-386 (for PS/2 Model 80)	call
RAMpage Plus 286 512k (for XT286/AT)	539.
RAMpage Plus MicroChannel 512k (for PS/2 Models 50/60)	539.

Amdek ... 90 days

LaserDrive-1 (external CD-ROM Drive)	629.
LaserDrive-2 (internal CD-ROM Drive)	629.

Compucable ... 2 years

2-Position switch box	29.
3-Position switch box	39.

Cuesta ... 1 year

Datasaver 400 Watt (standby power backup unit for the AT)	459.
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Curtis ... lifetime

ACCESSORIES

Curtis Clip CC-1	6.
Disk Holder DB-1 (holds 50 5 1/4" disks)	8.
3 1/2" Disk Holder DB-2 (holds up 40 disks)	8.
Printer Stand PS-1	18.
Universal System Stand SS-3	25.
Toolkit TK-1	25.

CABLES

Smartmodem-to-PC Cable EC-7 (9 feet)	17.
Printer-to-IBM cable EC-6 (9 feet)	17.

SURGE SUPPRESSORS

Filtered SafeStrip SPF-3	21.
Diamond SP-1 (6 outlets)	29.
Emerald SP-2	36.
Ruby SPF-2 (6 outlets; EMI/RFI filtered; 6 ft cord)	55.
Ruby-Plus SPF-2 Plus (w/FAX & modem protection)	69.

DCA ... 1 year

Irma 2 (3270 emulation board)	729.
Irma 2 Micro Channel (for PS/2 Models 50/60/70/80)	729.

Epson ... 1 year
We are an authorized Epson Service Center.

FX-850 (80 col., 264 cps, 9 pin)	call
FX-1050 (136 col., 264 cps, 9 pin)	call
LQ-500 (80 col., 180 cps, 24 pin)	call
LQ-850 printer (80 col., 264 cps, 24 pin)	call
LQ-1050 printer (136 col., 264 cps, 24 pin)	call

PC Connection Hardware Special

through March 31, 1989

Hayes ... 1 year thru PC Connection

Personal Modem 1200 w/Smartcom EZ

Designed for unsurpassed ease of setup and operation, this home telecommunications system provides a complete solution. The compact size and sophisticated design of this new Hayes modem offers reliable communications and state-of-the-art technology, all at an affordable price.

- Personal Modem 1200 plugs into a standard wall outlet, eliminating the need for a separate power supply
- Attached cable included with 9 and 24-pin adapters for easy connection to your PC
- Smartcom EZ Software makes communications easy, with menus and a "phone book" for storing frequently called numbers

Hayes Personal Modem 1200 w/Smartcom EZ (3 1/2" and 5 1/4" included) \$145.

LQ-2550 printer (136 col., 400 cps, 24 pin)	call
LX-800 printer (80 col., 180 cps, 9 pin)	call
Printer-to-IBM cable (6 feet)	15.

Everex ... 1 year

1200 Baud Internal Modem	79.
2400 Baud Internal Modem	149.

5th Generation ... 1 year

Logical Connection 256k	449.
Logical Connection 512k	499.

Hayes ... 2 years

Personal Modem 1200 (with Smartcom EZ; 1 yr. wrty thru PC Connection)	special
Smartmodem 1200	289.
Smartmodem 1200B (with Smartcom II)	289.
Smartmodem 1200B (hardware only)	259.
Smartmodem 2400	429.
Smartmodem 2400B (with Smartcom II)	429.
Smartmodem 2400B (hardware only)	399.

Hercules ... 2 years

Graphics Card Plus	189.
--------------------	------

1-800/243-8088



PC Connection 580W
6 Mill Street
Marlow, NH 03456

SALES 603/446-7721 **FAX** 603/446-7791

Intel ... 5 years

2400B Modem (internal modem for IBM-PC/XT/AT)	\$239.
2400B Modem 2 (internal modem for PS/2 Models 50/60/80)	269.
Inboard 386/PC w/1 Meg	729.
Inboard 386/PC Piggyback Card w/4 Meg	1699.
Inboard 386/AT (req. installation kit)	899.
Inboard Installation Kit (specify computer)	139.
Above Board Plus 512k	429.
Above Board 2 Plus 512k	479.
Above Board Plus I/O 512k	529.
Connection Coprocessor (FAX board plus)	769.
Optional 2400 Baud Modem for Connection Coprocessor	229.

MATH COPROCESSORS

8087 (for IBM-PC & XT)	95.
8087-2 (8 MHz, for PS/2 Models 25 & 30)	139.
80287 (for AT & XT286)	149.
80287-8 (for 8 MHz 80286 machines)	219.
80287-10 (for PS/2 Models 50 & 60)	259.
80387 (for 16 MHz PS/2 Model 80)	399.
80387-20 (for 20 MHz PS/2 Model 80)	459.

Kensington Microwave ... 1 year

Masterpiece	94.
Masterpiece Plus	109.

Key tronic ... 3 years

101 Keyboard	99.
101 Plus Keyboard (enhanced layout)	99.

Kraft ... 5 years

Three-button Joystick	33.
High Speed Joystick Adapter Card	25.
Adapter Card/3-Button Joystick Bundle	49.

KYE International ... lifetime

Dyna Mouse GM6+ (w/Dr. Halo III)	54.
----------------------------------	-----

Logitech ... lifetime

Series 2 Mouse (for PS/2 50/60/70/80)	65.
HiREZ Mouse (bus only)	89.
Mouse w/Paint Show (bus or serial)	95.
Mouse w/LogiCAD (bus or serial)	119.
ClearCase Mouse (serial only)	99.
ScanMan (hand held scanner)	199.

Magnavox ... 2 years

14" VGA Monitor (9CMO62)	389.
14" VGA Monitor (9CMO82)	449.
VGA Adapter (9AV600)	249.
14" Hi-Res Monitor (9CMO53)	369.

Microsoft ... 2 Years

Mach 20 (1 yr. wrty.)	349.
Disk + Option (for Mach 20; 1 yr. wrty.)	69.
Memory + Option (for Mach 20; 1 yr. wrty.)	339.
Mouse with Paintbrush (bus or serial)	109.
Mouse with Easy CAD (bus or serial)	125.

MSC Technologies ... lifetime

OmniMouse (serial only; 1 year warranty)	57.
--	-----

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NSTL TEST REPORT

Two New 2400 PS/2 Modems Equal Hayes Performance

The MultiTech MT224ES and the Intel 2400B internal 2400-bps modems perform well enough to stand up to the Hayes Smartmodem 2400.

Originate mode

Signal-to-white-noise ratio

Impairment level	10:1	11:1	12:1	13:1	14:1	15:1	16:1	17:1	18:1	19:1
Hayes Smartmodem 2400	—	100	100	96	81	29	14	2	4	0
Intel 2400B Modem 2	—	—	—	—	56	—	7	6	0	0
MultiTech MT224ES	—	100	100	91	73	38	12	8	0	0

— means "no connect."

Phase jitter

Impairment level (in degrees)	35	34	33	32	31	30	29	28	27	26	25	24	23	22	21	20	19	18
Hayes Smartmodem 2400	83	84	89	66	67	63	45	31	30	18	14	7	4	4	3	2	1	0
Intel 2400B Modem 2	100	95	97	93	80	77	63	52	41	37	24	16	13	9	5	2	3	0
MultiTech MT224ES	94	91	78	79	66	52	41	38	26	16	10	7	7	5	0	0	2	0

Amplitude jitter

Impairment level (in percent)	35	34	33	32	31	30	29	28	27	26	25	24	23	22	21	20	19
Hayes Smartmodem 2400	81	80	71	59	50	33	18	13	8	3	4	3	0	0	0	0	0
Intel 2400B Modem 2	72	86	84	76	57	45	40	29	18	14	7	7	1	1	1	2	0
MultiTech MT224ES	84	70	64	50	39	24	18	9	9	2	1	1	0	0	0	0	0



NSTL tested each modem's ability to transmit data accurately over noisy telephone lines using the TAS 1010 VoiceBand Channel Simulator. The system includes the Network Simulator, which mimics public and leased lines, and the Modem Test Unit, which automatically runs desired data back and forth between the test modem and a control Hayes Smartmodem 2400 and calculates resulting data transmission errors. In these tests, 10K simulated test files in 100-byte blocks were received by each examined modem and the block errors measured and reported. All tests were performed in originate mode. Starting values for the

key impairments tested—white noise, phase jitter, and amplitude jitter—were based on AT&T Bell Labs' 1982-1983 *End Office Connection Study*. White-noise impairments ranged from 10:1 to 19:1. An impairment was lessened one step at a time to determine the point at which a modem could correct all the errors in a transmitted block. [In the MultiTech MT224ES white-noise test, for example, at the 13:1 signal-to-noise ratio, an average of 97 out of every 100 blocks contained errors. The error rate dropped to 0 at 18:1.]

Phase jitter tests were conducted in the same manner; phase jitter intensities spanned 35 de-

grees to 18 degrees. In the amplitude jitter tests, the intensity of the impairment ranged from a maximum of 35 percent to 19 percent.

Note: The impairments encountered on average phone lines are much lower, and these modems should have no difficulty communicating under normal circumstances. The average signal-to-white-noise ratio is 34:1; phase jitter is 8 degrees; and amplitude jitter, 4 percent.

Data based on tests designed and conducted by National Software Testing Laboratories (NSTL). All rights reserved.

compatibility could prove troublesome. The 2400B's lower price, five-year warranty, and superior Hayes compatibility give it the edge. —TJ Byers

WHERE TO BUY

Intel 2400B Modem 2

Intel Corp.
5200 N.E. Elam Young Pkwy.
Hillsboro, OR 97124
503/629-7354

List price: \$445

Accessories: none

Warranty: five years parts and labor

Extended warranty: none

Technical support: toll-free number, M-F 7-5

Other support services: 24-hour BBS

For more information, circle 693 on reader service card.

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Customer Profile

Regis McKenna

Age: Old enough to remember the day that Intel Corporation was founded.

Profession: Chairman of Regis McKenna Inc., a major marketing company based in "Silicon Valley." A general partner in the venture capital firm of Kleiner Perkins Caufield & Beyers. Author of the *Regis Touch* and most recently, *Who's Afraid of Big Blue?**

Hobbies: Enjoys doing extensive research on innovative new technologies. He recently became involved in building and archiving an extensive database, using state-of-the-art page recognition software.

His Page Recognition Software: *OmniPage* of course. According to Regis: "*OmniPage* represents one of the most complete page recognition software products; providing incredible flexibility to customize data which can be easily accessed later. All of a sudden the cost of archiving and retrieving data has dropped significantly. The 'Information Age' is upon us and we have an exciting new tool!"

Favorite Quote: The New York Times: "*OmniPage* could be the most significant advance in personal computing this year."

Things Disliked Most: "Technology that is not easily accessible or powerful enough to serve the needs of people."

Favorite Scan: "I'm using *OmniPage* to build an extensive electronic library that pertains to the growth and evolution of technology over the past 25 years. Being able to scan literally any article, regardless of layout or column format, has suddenly made this all possible. It's eliminated the labor intensive task of data entry. I'll be able to share this information with employees, customers and colleagues over time. It's an exciting collection of business case studies for future reference."

Future of Page Recognition: "*OmniPage* has provided me with the customizable tool that I need. I can use the Partial Page feature to scan only that text which is relevant to my needs. Having a version that runs in MS-Windows should impress those who are committed to that environment. What we're seeing here is the emergence of a new product category!"



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Los Gatos, CA 95030 Or Call: 1-800-535-SCAN

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*Regis McKenna's exciting new book, *Who's Afraid of Big Blue*, is available in hardcover and published by Addison-Wesley Publishing. © Copyright 1988, Caere Corporation. All rights reserved.

CAERE®

Circle 17 on reader service card

MultiTech MT224ES

MultiTech Systems, Inc.
82 Second Ave. SE
New Brighton, MN 55112
612/631-3550

List price: MT224ES \$549, MT224PC
(without MNP protocol) \$499

Accessories: none

Warranty: two years parts and labor

Extended warranty: \$20 per year

Technical support: toll-free number,
M-F 8:30-5

Other support services: 24-hour
BBS

For more information, circle 694 on
reader service card.

Plus Passport

Removable hard disk

PROS: Fast, easy to install

CONS: Cannot boot OS/2, slow inser-
tion/ejection process

Removable hard disks offer infinite headroom, data portability, and excellent security (if the data is locked in a safe, no one can fiddle with it). Until recently, however, removables tended to be slow and difficult to install (see "Removable Resources," *PCW*, December 1987).

Plus Development's removable Passport drive is a breakthrough: It's not cheap (the 20MB unit costs \$1250), but it eliminates most of the installation agony. And at 28ms average access time, it is impressively fast, rivaling even the speedier conventional hard drives.

The Passport system consists of a docking unit that mounts permanently in a vacant half-height drive bay; a half-length, 8-bit controller board; and a 20MB or 40MB cartridge—actually a sealed Winchester drive—that slides into the docking unit. It takes 16 seconds for the drive to settle in and spin up to speed. Pressing a button on the face of the unit locks the heads and ejects the cartridge in 12 seconds. The 20MB and 40MB cartridges can be used interchangeably with the same Passport docking unit.

The Passport boasts some savvy features. Convenient switches on the back of the cartridge allow you to designate it as the boot drive, or make it read-only for extra data security. With your choice of controller cards,

the Passport works equally well in AT-bus and PS/2 machines. To speed performance even further, Plus builds a read/write buffer for disk caching right into the controller.

Installing the Passport system takes about 90 minutes, and while it's a fairly simple procedure, it's not for the faint of heart. You may have to move some boards and cables to slide the docking unit and controller board into place. Still, compared with the older generation of removables, the Passport's a dream: no cable switching, no jumper pulling, no major hassle.

The cartridges are engineered to withstand falls from up to 2 feet. In fact, when a cartridge was accidentally knocked off my desk, it showed no ill effects. A fail-safe hardware system called Airlock physically lifts the heads away from the disk's media whenever power is turned off (or fails).

The Plus Passport offers a winning combination of easy installation and excellent performance. If you've been waiting for someone to work out all the bugs before you "go removable," your wait is over. —*Paul Meyers*

WHERE TO BUY

Plus Passport

Plus Development Corp.
1778 McCarthy Blvd.
Milpitas, CA 95035
408/434-6900

List price: with adapter board and housing, 20MB Passport \$1250, 40MB Passport \$1450; add \$100 for Micro Channel

Accessories: adapter and base \$659, Micro Channel version \$759, base \$349, 20MB disk \$595, 40MB disk \$795, external chassis \$399

Warranty: one year parts and labor

Extended warranty: none

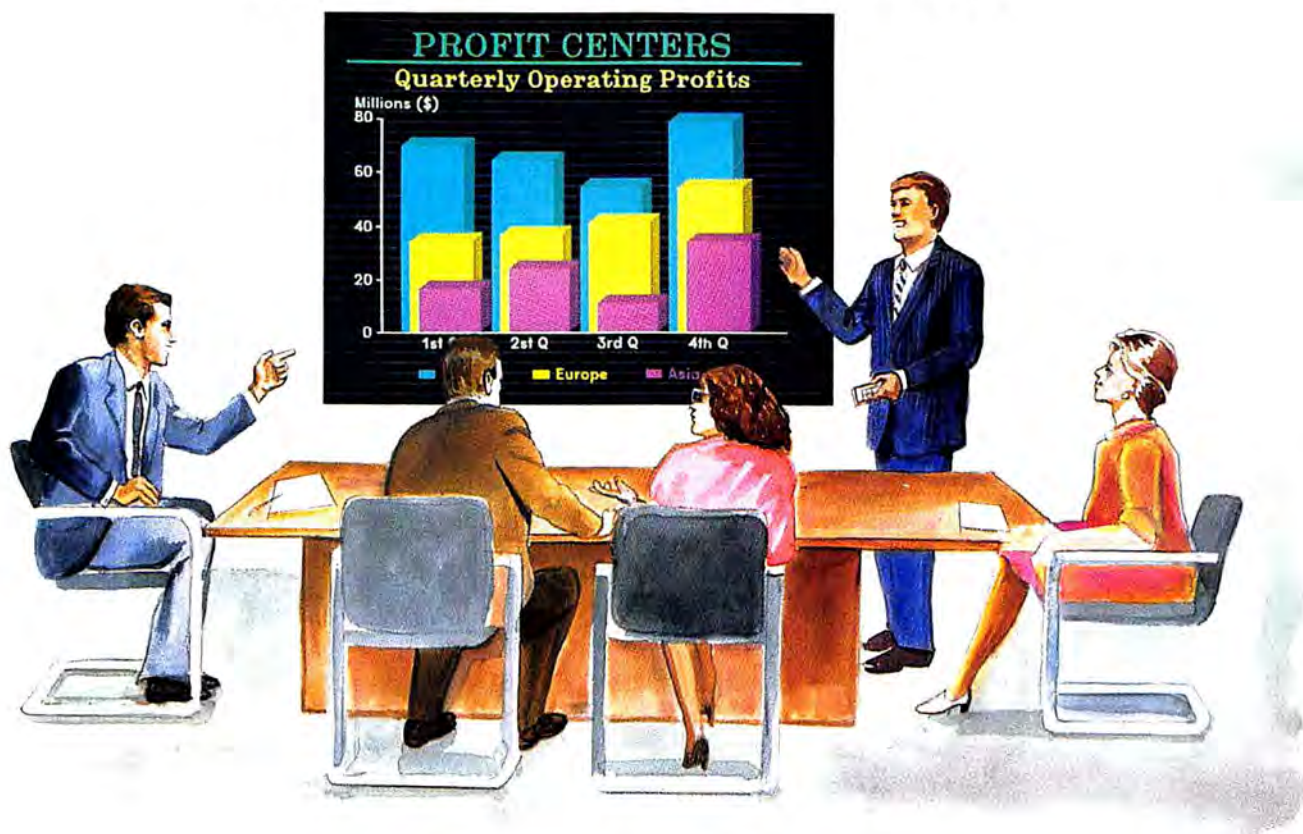
Technical support: toll-free number,
M-F 9-5

Other support: none

For more information, circle 695 on
reader service card.

Paul Meyers is a San Francisco-based video producer and freelance writer specializing in science and technology. TJ Byers is a contributing editor for PC World. ●

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148 **PFS: First Graphics 1.0,
Graph-in-the-Box 2.2**

In head-to-head competition, First Graphics offers word charts and elegant font control, but Graph-in-the-Box can pull in data and slap a chart on screen in seconds.

150 **Turbo Pascal 5.0**

Borland goes its exemplary Pascal compiler one better by adding symbolic debugging, better graphics support, and overlays—a Best Buy.

154 **Trading Post**

At last, you can use a PostScript printer with such applications as spreadsheets, data bases, and accounting packages. Another Best Buy.

156 **Prodigy**

Display the day's weather and news events or ask Jane Fonda for some words of wisdom with a lightweight home videotex/E-mail service from IBM and Sears.

160 **Relay Gold 3.0**

This upgraded communications program lets you use expanded memory, run multiple sessions, and create menus, but its file transfers can be slow.



PFS: First Graphics 1.0

Low-end charting program

PROS: Impressive screen output, good control over fonts and attributes

CONS: Limited file exchange and charting options

Graph-in-the-Box 2.2

Low-end charting program

PROS: Excellent data import and export, optional memory-resident mode

CONS: No support for word charts, can't change default font or type sizes

Want to pepper a report with a few charts, but haven't time to master *Freelance Plus* or *Harvard Graphics*? Take heart. The low end of the chart-making scale has a pair of inexpensive packages that can get even a novice graphing within minutes. *PFS: First Graphics 1.0*, a subset of *Harvard Graphics* from Software Publishing Corporation, shines in its editing control over text and chart attributes, and in the quality of its output. But if you want quick and dirty graphs, try the latest version of New England Software's RAM-resident wonder *Graph-in-the-Box*.

Though neither package has any drawing talent, both sport solid charting features. Each program offers variations on six basic graph types and provides reasonable control over colors, line styles, titles, and labels. *PFS: First Graphics'* forte is word charts, making it a natural for desktop presentations. *Graph-in-the-Box's* strong suit is grabbing data from applications as easily as painting a worksheet range.

Graph-in-the-Box has long been known for its snap-and-show approach to chart making. Open the package over any application—1-2-3, say—mark the beginning and end of a data range, and you can put a graph on screen in seconds. The current update of this once toylike program has gained grown-up features, including a much-improved chart selection and 16-color palettes for EGA and VGA displays. (New England's new \$199.95

Graph-in-the-Box Analytic offers even more graph types.) Moreover, *Graph-in-the-Box* exports files in a wealth of formats—including CGM, PostScript, HPGL, and DIF—so you can slug charts into documents produced with such programs as *WordPerfect 5.0*, *Ventura Publisher*, and *PageMaker*. *Graph-in-the-Box* also supports some 100 printers and 30 plotters.

By contrast, about all you can do with *First Graphics* charts is print them; only Software Publishing's *Professional Write* and *Harvard Graphics* can use the program's image files. On the import side, *First Graphics* supports only 1-2-3 worksheet files. Even worksheets from *PFS: Professional Plan*, Software Publishing's own spreadsheet program, must be converted to .WKS or .WK1 format before you can use them in *First Graphics*.

First Graphics' main strength is its healthy selection of attractive charts, including overlapping bar, 3-D bar and pie, scatterplot, word, area, and high/low/close charts. *Graph-in-the-Box*'s selection is a bit more limited, including clustered bar, vertical area, scatter, step, step-and-filled-area, pie, and mixed charts—with no 3-D effects.

Though it's more Spartan, *Graph-in-the-Box* offers lightning speed and the freedom to change your mind. You can quickly toggle through chart types, colors, and other attributes on a layout screen, then press a function key to see the results. The layout screen also lets you edit titles and axis labels and set scaling. You change the underlying data in a separate, worksheetlike screen, where you can also add new values to a chart. But where *First Graphics* gives full control over fonts, *Graph-in-the-Box* limits users to a default font and text size.

Though options are limited in these packages, both make it easy to customize a chart. *First Graphics* automatically fills in variables such as days of the week, dates, and so on. *Graph-in-the-Box* lacks this depth of control, but it offers more line types, fill patterns, and scatter marks. And you can instantly

change a chart's background color, something you can't do in *First Graphics*.

First Graphics gains its most noticeable edge with word charts, which can be bulleted lists or free-form. It comes with five fonts including Roman, Sans Serif, and Gothic, and lets you specify text sizes ranging

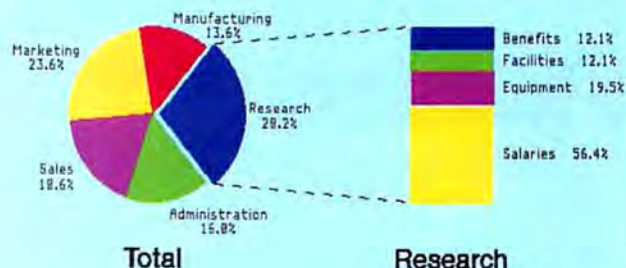
FEATURES EVALUATION

PFS: First Graphics Leads Graph-in-the-Box

Clash at the low end—PFS: First Graphics wins on features, Graph-in-the-Box on speed.

	PFS: First Graphics 1.0	Graph-in-the-Box 2.2
Bar graphs		
Vertical/horizontal bars	●	●
Maximum data sets per clustered bar graph	8	16
3-D bar graphs	●	○
Pictographs	○	○
Bar/line graphs	●	●
Pie charts		
Maximum slices per pie	12	16
Two- or four-pie charts	●	○
3-D pie charts	●	○
Line graphs		
Line graphs and scatterplots	●	●
Maximum data points per line	60	500
Maximum data sets per line graph	8	16
Area graphs	●	●
Other chart types		
Gantt charts	○	○
Word charts	●	○
High/low/close charts	●	○
Organizational charts	○	○
Data exchange		
Reads ASCII	●	●
Reads .WKS, .WK1	●	●
Reads/writes .PIC	○	●
Reads/writes TIFF	○	●
Reads/writes CGM	○	●
Creates HPGL files	○	●
Ventura- and PageMaker-compatible	○	●

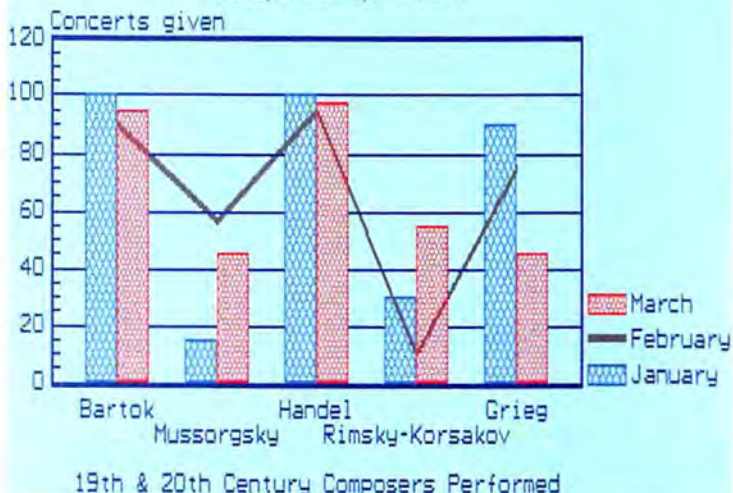
Software Expenses 1988



Total

Research

Musical production figures USA/Europe 1st qtr. 1989



PFS: First Graphics lets you link two kinds of graphs on screen. Here, a stacked column gives the details from a 2-D pie section.

Memory-resident **Graph-in-the-Box** grabs data and displays it in seconds.

from 1 to 32 points. You can't mix fonts in the same chart, but you can highlight text in different colors.

If you need to generate word charts for desktop presentations, *PFS: First Graphics* should get your nod. Its richer options and steeper learning curve pay off in better-looking charts. But if you're in a rush, grab *Graph-in-the-Box*. Charting doesn't get any easier. —Alan Southerton

WHERE TO BUY

PFS: First Graphics 1.0
Software Publishing Corp.
1901 Landings Dr.
Mountain View, CA 94043
415/962-8910
List price: \$149

Requirements: 320K, two disk drives, DOS 2.0 or later version
Not copy protected

Technical support: unlimited, no toll-free number, M-F 8-4

Other support services: CompuServe forum (GO SPCFORUM), quarterly newsletter free to registered users
For more information, circle 620 on reader service card.

WHERE TO BUY

Graph-in-the-Box 2.2

New England Software Inc.
Greenwich Office Park #3
Greenwich, CT 06831
203/625-0062

List price: \$139.95, upgrade from version 1.3 \$35 (\$15 for disk only)

Requirements: 128K, DOS 2.0 or later version

Not copy protected

Technical support: unlimited, no toll-free number, M-F 9-5

Other support services: none
For more information, circle 621 on reader service card.

Turbo Pascal 5.0

Pascal compiler with editor and debugger



PROS: Extremely fast compilation, built-in symbolic debugger, creates overlays, expanded memory support, automatic coprocessor emulation

CONS: More expensive and RAM-hungry than earlier versions, debug window hides program screen

Turbo Pascal originally appealed to beginners who enjoyed easy editing and quick compilation of relatively small programs. Version 4.0 transformed *Turbo Pascal* into a professional programming tool (see *The Software Shelf, PCW*, August 1988). *Turbo Pascal 5.0* continues this metamorphosis, offering built-in symbolic debugging, expanded graphics support, and the return of version 3.0's overlay capability.

As *Turbo Pascal's* power increases, so do its price and memory requirements—now 448K, up from 384K. In NSTL tests, *Turbo Pascal 5.0's* lightning-fast compilation speeds were slower than its predecessor's, but the programs it compiles executed faster.

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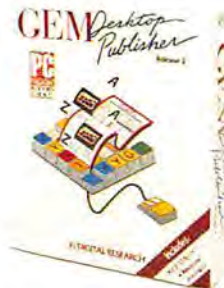
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For more information, contact your nearest dealer or call (800) 443-4200.

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Circle 266 on reader service card

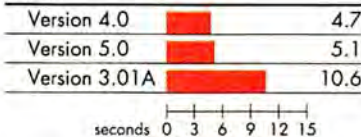
NSTL TEST REPORT

Turbo Pascal 5.0: Better Than Ever

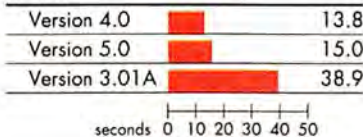
Turbo Pascal 5.0 compiles a tad slower than 4.0, but its programs execute faster.

Compilation

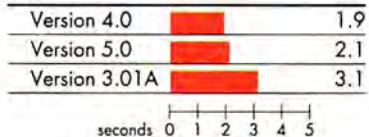
Btree



Chess

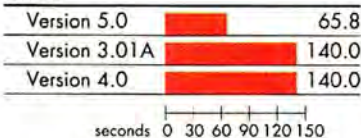


Sort1

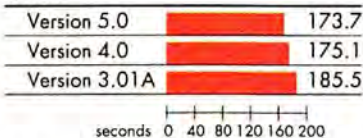


Execution

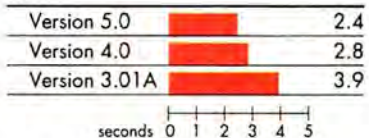
Btree



Chess



Sort1



Benchmarks were performed on an 8-MHz IBM AT Model 339 with a 30MB hard disk and a monochrome video adapter. Three programs, Btree and Sort1 from the Turbo Pascal 3.01 Database toolbox and Chess from the 3.0 Gameworks toolbox, were used to compare 3.0 to 4.0 and 3.0 to 5.0. Because Turbo Pascal 4.0 and 5.0 use different syntax from 3.0, the Upgrade program provided for 5.0 was used to convert the test programs for use with 5.0.

The Btree benchmark sent all 1000 records of randomly generated data—indexed by customer

code and customer name—to a null printer (a device that simulates an infinitely fast printer, one not slowed by paper or printhead movement). The Sort1 benchmark read from disk the sample customer file provided with the Database toolbox, sorted the data in memory, and then displayed the records on the screen. Almost all the difference in execution speeds is due to the difference in screen updating routines of 3.0 versus 4.0 and 5.0. The Chess benchmark timed how long the program took to respond to a particular move in a specific situation, with the program's "performance level" set to five.

Compilation

The compilation benchmarks compared the time each version took to compile the test programs' ASCII source code files into .EXEs.

Execution

The execution benchmarks compared the execution speeds of 3.0-compiled .EXEs to those of 4.0-compiled .EXEs and 5.0-compiled .EXEs.

Data based on tests designed and conducted by National Software Testing Laboratories (NSTL). All rights reserved.

The biggest addition to version 5.0 is symbolic debugging, which lets you execute a program one line at a time and track down errors quickly. The built-in debugger takes over if you hit <Ctrl>-<Break> while the program is running. The code that was executing appears in the edit window, and you can examine and change any of the variables. If the program is in the middle of a procedure or function, you can find out what procedure called it. You can then restart the program where it left off, or continue stepping through it line by line.

To make the program stop every time execution reaches a certain line—just as if you'd pressed <Ctrl>-<Break> there—you set a *breakpoint* on that line. You can also speci-

fy *watch variables*, whose values are displayed in a window every time execution stops.

Borland has also brought out *Turbo Debugger* for use with Pascal, C, and assembly language. Unlike *Turbo Pascal's* built-in debugger, *Turbo Debugger* can trace *all* .COM and .EXE files at the machine-instruction level and use the 80386 in virtual mode. For \$250, you can get *Turbo Pascal*, *Turbo Debugger*, and the fast *Turbo Assembler*—Borland's first assembly language release—packaged together as *Turbo Pascal Professional*.

Add-on programs aren't the only enhancements to *Turbo Pascal 5.0*. The ability to



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We could go on about the many features of Symphony 2.0—how its macros let you automate complex or repetitive tasks and create customized applications. How the word processor now has a spelling checker and text outliner. And how database and communications have been improved.

The bottom line is that Symphony is one high performance package that's made to be opened up.

Current Symphony users: call 1-800-Trade Up and ask for extension 204 to upgrade to Release 2.0.



Lotus Symphony 2.0

```

File Edit Run Compile Options Debug Break/watch
Edit
Line 773 Col 1 Insert Indent
status := normal;
curline := firstline;
while curline <> nil do
begin
  printline(curline^.txt);
  curline := curline^.next;
end;

write(outfile,^L);
write(outfile,resetprinter);
close(outfile);
end.

Watch
*curline: PTR($7152,$0)
infile: (CLOSED,'PL.PAS')
header: 'PL.PAS Monday 7 Nov 1988 23:18'
maxlinefound: 98
leftmargin: 21
printerwidth: 132

Break/watch
Add watch Ctrl-F7
Delete watch
Edit watch
Remove all watches

Toggle breakpoint Ctrl-F8
Clear all breakpoints
View next breakpoint

F1-Help F5-Zoom F6-Switch F7-Trace F8-Step F9-Make F10-Menu

```

Turbo Pascal 5.0 combines editing, compiling, and debugging. The screen is divided into pop-up windows. Compilation is almost instantaneous.

create overlays—available in version 3.0 but dropped in 4.0—is back, letting you once again write a program larger than available RAM and load it from disk one piece at a time. In version 3.0, you had to declare overlays as “overlay procedures” or “overlay functions,” and they couldn’t be recursive. In version 5.0, you can code them exactly like ordinary procedures or functions (including the ability to use recursion) and use the calling program to place them in an overlay or in memory. *Turbo Pascal 5.0* can store overlays in expanded memory, and the debugger can trace overlaid code.

Version 5.0 also has automatic coprocessor emulation, so a single compiled *Turbo Pascal* program can run on machines with and without coprocessors. The program uses an 8087, 80287, or 80387 math coprocessor if one is present. If it’s missing, the program uses the CPU to emulate it.

The new version expands graphics support somewhat. It supports the IBM 8514/A in its 1024-by-768-pixel mode and gives you two new procedures, SetRGBPalette and SetRGBColor, to access the VGA’s full range of 262,144 colors.

Turbo Pascal 5.0 does have one really annoying habit. In the editor/compiler environment, as soon as a program finishes running, its output disappears from the screen. You can bring it back by pressing <Alt>-<F5>, but this is an awkward step.

Still, *Turbo Pascal* is unique. It’s a versatile, universal package, and no other Pascal

compiler comes close. Plus, good third-party subroutine packages, such as *Turbo-Plus 5.0* from Nostradamus in Orem, Utah, take the headaches out of windows, menus, and file manipulation. Many of us like Pascal because it’s simpler than BASIC and less cryptic than C. Unless you’re a professional programmer, there’s no reason to look to any other language for greater power or efficiency.

—Michael Covington

WHERE TO BUY

Turbo Pascal 5.0

Borland Int’l
1800 Green Hills Rd.
Scotts Valley, CA 95066-0001
408/438-8696

List price: \$149.95

Requirements: 448K, DOS 2.0 or later version

Not copy protected

Technical support: unlimited, no toll-free number, M-F 8–5

Other support services: CompuServe forum (GO BPROGA), BIX forum (JOIN BORLAND), support via MCI Mail

For more information, circle 622 on reader service card.

Trading Post

PostScript printer utility



PROS: Easy to set up and modify, transparent operation, works with network spooling software, speeds serial printing, requires only 5K

CONS: Can’t print text attributes within a document, no graphics conversion

People usually buy a PostScript printer to enhance their word processing or desktop publishing output but are plagued by a constant problem: Applications such as spreadsheets, data bases, and accounting packages don’t support PostScript. Now a handy TSR from LaserTools Corporation called *Trading Post* lets you print on PostScript printers from almost any program and easily determine specific fonts and printing parameters for each application. The \$79 utility’s only drawback is that it limits output from non-PostScript applications to straight text.

Trading Post eats only about 5K of RAM and is transparent in operation. You can

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DataLife

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2S/2D
MD 2

DataLife

DataHold
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Circle 315 on reader service card



Trading Post lets you configure your serial printer port to work at high speeds and set up "managed" ports to bring PostScript printing to non-PostScript programs.

create up to eight "managed" (virtual) DOS serial or parallel ports, each with a set of printing parameters. Then you configure each of your applications to use a vanilla text driver (often called ASCII or Standard Printer) to print to one of the ports. *Trading Post* works its magic by intercepting printer output sent to a virtual port and funneling it to the actual port your printer is attached to.

Thanks to a generous series of pulldown menus, installing *Trading Post* is quick work. You configure the managed ports by specifying such parameters as orientation, typeface and size, lines per page, paper bin, and so on. For spreadsheets, you might set up a port (LPT1:, for instance) to print 6-point Helvetica text in landscape mode on legal-size paper. Another managed port might be set up to print your data base reports in 10-point Times Roman in portrait mode on letter-size paper. Finally, you could use a third port to print from programs that speak PostScript.

After configuring the ports, you tell *Trading Post* what port your printer is attached to, and whether it's connected to a print spooler or network. *Trading Post* can even raise the serial port bps rate from 9600 to as much as 57,600 (if you can find a printer that communicates reliably at that speed). LaserTools claims network software that intercepts printer output will work with the program.

Trading Post's biggest failing is that it allows PostScript-clueless programs to print only straight text. Even if your data base package lets you specify boldface or underlining for a text selection, it won't print that way. Everything in the document is in the same font, with no special attributes. Don't expect to print justified text, either; your software thinks it's printing to a dumb printer, not a typesetter.

Trading Post's snazziest feature is the way it lets you set and forget special print parameters for each of your applications. But its biggest benefit is also the most basic one: *Trading Post* finally lets PostScript owners use their high-end printers with common PC programs. —Steve Roth

WHERE TO BUY

Trading Post 1.0

LaserTools Corp.
3205 Buena Vista Way
Berkeley, CA 94708
800/346-1353, 415/843-2234

List price: \$79

Requirements: 5K, DOS 2.0 or later version

Not copy protected

Technical support: unlimited, toll-free outside California, M-F 8:30-5

Other services: 30-day money-back guarantee

For more information, circle 623 on reader service card.

Prodigy

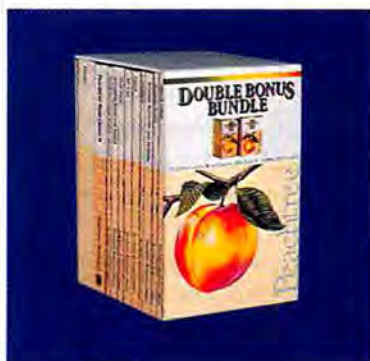
On-line news and E-mail service

PROS: Very inexpensive, easy to use, slick graphics

CONS: Skippy information, poor electronic mail

IBM and Sears have joined forces to create Prodigy, a home videotex and E-mail service that's pretty to look at, slim in content—and very cheap. While the CompuServes of the world lure subscribers with massive downloadable software collections and endless tech chatter, Prodigy zaps users with a *USA Today*-like mix of news nuggets and snappy weather maps. It also offers on-line banking, a travel reservation service, and shopping opportunities galore. Prodigy even flashes three-line ads on your screen for everything

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a savings of \$100! Either way, Peachtree offers you the most accounting you can get for your software dollar.

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- Inventory
- Fixed Assets
- Accounts Receivable
- Invoicing
- Job Cost
- Payroll

And Peachtree Complete II is designed using the latest software innovations, like full-color scrolling reference tables, pop-up windows, and short-cut keyed menus. We've expanded to allow an unlimited number of companies, added service invoicing, range printing, and more.

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Now you can extend the power of your Peachtree accounting to include custom reporting and analysis, and save even more money! Order the Double Bonus Bundle and you'll get Peachtree Complete II, plus Peachtree Data Query II Enhanced, for just \$298.

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HARDWARE SPECIFICATIONS: Requires PC/MS-DOS version 2.0 or higher with 384K of usable memory (512K required with DOS 3.3) and a minimum 10 MB hard disk. For use with the IBM® PC, PC XT, PX AT, Personal System/2™ and compatibles. 3 1/2" media optionally available. Not copy protected.

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Circle 144 on reader service card

from kayaks to pantyhose. It's light fare, but you can't beat the price: \$9.95 a month buys unlimited on-line time for up to six people in one household.

To access Prodigy, you need a \$49.95 start-up kit that includes instructions and the service's custom telecommunications software. An extra \$100 gets you a special pocket-size Hayes 1200-bps modem that plugs directly into a wall outlet.

For a service designed for home computer-niks, however, Prodigy demands the hardware of a business PC. It requires a graphics adapter, yet only displays color screens with a EGA card. It doesn't support the VGA and won't run with an IBM EGA card hooked to a monochrome monitor. Worse, it's grievously slow when running on anything less than an AT.

Prodigy's custom software generates video pyrotechnics on cue from the on-line system, so Prodigy doesn't have to transmit its art deco over pokey phone lines. But the program chews up 512K of RAM and won't run with any memory-resident programs. And novices will find downloading information tricky: You instruct the Prodigy software to print it out, then redirect the output to a disk file using DOS commands.

To log on to Prodigy, you just type a user ID and password. Once connected, you're greeted by a screen ablaze with the day's headlines and a blinking icon if you have

E-mail waiting. Navigation is strictly point and shoot. To skip from one corner of the service to another, you summon pop-up menus, or create a path that zips you to pre-determined locales on the system whenever you log on.

Information-wise, Prodigy is as light as cotton candy. News stories appear in a flash of crayon-thick letters, and though the likes of Jane Fonda and Howard Cosell will answer questions on line, their offerings are seldom more than a couple of aphoristic lines. Prodigy offers free stock quotes with a 15-minute delay. At press time, the only forums Prodigy offered were the PC Club and the Food and Wine Club, though more were promised.

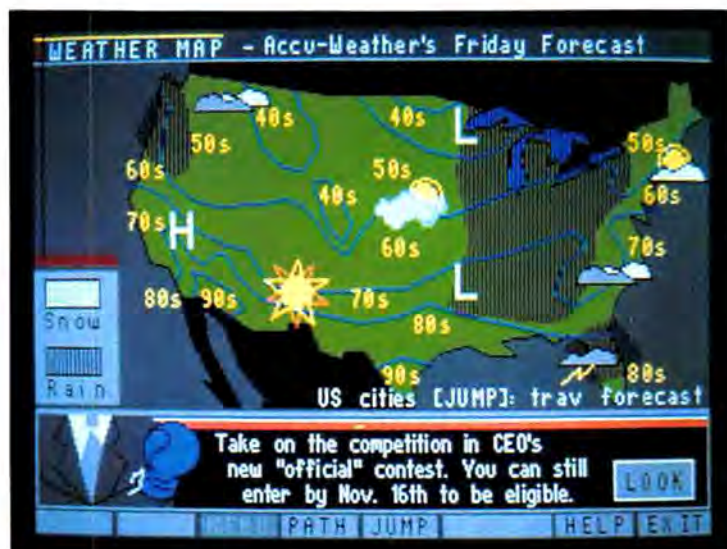
Finally, Prodigy's private electronic mail facility is Lilliputian. Messages are limited to about 250 words, and you can't edit or carbon copy them, or get word that yours have been received.

Prodigy is aware of its shortcomings, and plans to improve its news coverage and expand its reach. At press time, Prodigy was available only in Atlanta, Connecticut, and parts of California. A dial-up node in the Baltimore-Washington area was planned for spring, with others in New York and Detroit to follow.

Dialing into Prodigy may not be the same as visiting the library at Alexandria, but then it isn't meant to be. For free stock quotes and all the E-mail you want, \$9.95 a month looks like a bargain. If you want video news, though, spend the money on cable TV.

—Judy Getts

A blaze of icons and graphics make Prodigy a feast for the eyes. Many users will start the day with a snappy weather map.



WHERE TO BUY

Prodigy

Prodigy Services
445 Hamilton Ave.
White Plains, NY 10601
800/822-6922

Requirements: 512K, two disk drives, DOS 2.0 or later version, graphics adapter, 1200-bps modem

Operating hours: 7 a.m.—1 a.m. EST, 6 a.m.—midnight PST

List price: start-up kit including software, instructions, and three months of use \$49.95; start-up kit with 1200-bps modem \$149.95; basic monthly fee \$9.95, extra charge for on-line banking and other services

Technical support: unlimited, toll-

Read It And Reap.

TO: Any one interested in writing improvement
 FROM: Ken Dickens, ad writer
 RE: Writing improvement with NEW Grammatik III, a demo disk, and a contest to get both ABSOLUTELY FREE

"Software to easily help me write more better (not just easier or faster, but "better")?" "Right, Don." That's what I said last year when the president of Reference Software bet a gourmet lunch that Grammatik II could help even me. I lost. He ate quail eggs. I ate crow.

Now there is Grammatik III. Don says "it's a super whiz-bang high-tech expert system artificial intelligence writing improvement program that makes Grammatik II (and all other grammar checkers) look like Dick and Jane readers. He wants to bet lunch again.

What should I do?

He says Grammatik III actually "proofreads" your writing (how can it do that?) for errors in grammar, style, usage, and spelling. It can recognize nouns, verbs, adverbs, articles, adjectives, and pronouns so it catches a number of problems no other grammar or spelling checker can. It's simple too use. Give Grammatik III your document's name. Watch it work, right on the screen (it can't be that easy, can it?). He says it identifies writing problems, offers suggestions for improvement, and get this, lets you ignore the suggestion and continue, or make changes in your document immediately. Without ever going back to to your word processor.

Then he gave me this example, (which I don't believe even for a minute): Grammatik III might stop on a sentence like "Its a long way to Tipperary", tell you that the word following "its" is usually incorrect after an possessive pronoun, and suggests "It's" instead.

I laughed. I knew it was impossible. Don smiled and very calmly explained that although Grammatik III is not perfect, it finds errors like incomplete sentences, improper use of homonyms (like "their" instead of "there"), split infinitives, subject/verb and noun/modifier disagreements, passive voice, and etc. It even catches unbalanced punctuation, doubled words, transpositions (like form/from). . . . He went on for fifteen minutes.

Software can't do that. Can it? But if it did. . . better writing brings big bucks (and I do have three kids to support). Should I take the bet? I'm confused. Help! Before I try it, tell me if Grammatik III helps your writing. Enter this contest (the details are below), try Grammatik III free, and let's discuss it over dinner. In San Francisco.

Ken Dickens

POSSESSIVE ERROR, ONLY 18 TO GO, GOOD LUCK

The Contest Everyone Wins.

New Grammatik III found nineteen practical ways to improve this memo in just over one minute. If you can circle the same problems and explain what the problems are, we'll send you Grammatik III absolutely free. Go ahead, try it. Because even if you miss them all you'll receive a FREE Grammatik III demo disk just for entering. And, you'll automatically be entered in our "Dinner in San Francisco" drawing.† The contest is great, but here's an even

faster, easier way to get better writing. Order Grammatik III right now for only \$99 with our "30-Day Write Better or Your Money-Back Guarantee." New Grammatik III. It's the risk-free way to reap the rewards of better writing.

Order Today:
 (800) 872-9933
Grammatik III
 Powerful Writing Improvement



Here's my contest entry. Please send me a FREE Grammatik III demo disk (\$4.95 value).
 Please send me _____ copies of Grammatik III for \$99 ea. plus \$7.50 shipping (\$10 per unit outside USA) CA residents add applicable sales tax.

I enclose \$ _____ VISA MC AM Exp. _____

Card # _____
 Name _____
 Company _____
 Address _____
 City/State/Zip _____
 Phone (_____) _____
 330 Townsend St. Suite 123, San Francisco, CA
30-Day Money-Back Guarantee

*RightWriter owners call for special \$29 trade-up offer or get a FREE copy of Grammatik III if RightWriter finds all the mistakes in the above letter. Grammatik II owners call for low-cost upgrade. †Limit one (1) free Grammatik III package and Grammatik III demo disk per person/address. San Francisco trip is for two (2) and includes round trip airfare from anywhere in the continental U.S., one night's hotel accommodations, and dinner with Don Emery and Ken Dickens. Travel arrangements will be made by Reference Software. Contest ends March 15, 1989. Drawing to be held from all entries postmarked before March 15, 1989. Contest entries using Grammatik III will be disqualified. Grammatik is a trademark of Wang Reference Software is a trademark of Reference Software, Inc. © 1988

Circle 282 on reader service card

Reference

All Ne (Right U)

free number, available only during Prodigy's operating hours
For more information, circle 624 on reader service card.

Relay Gold 3.0

Communications program

PROS: Offers IBM 3270 software terminal emulation; powerful, easy-to-use scripting language

CONS: Slow file transfers, clunky editor with forgettable commands

When *Relay Gold 2.0* came out in 1987, MIS managers got a smooth telecommunications software link between PCs and IBM VM/MVS mainframes. Used in conjunction with another Relay Communications product, *Relay 3270*, it supported 3270 emulation with software, thereby eliminating the IRMA card hardware overhead. With *Relay* running on both ends, users could dial up the company mainframe from anywhere without an IRMA card.

Now Relay Communications has amalgamated *Relay Gold 2.0* and its general-purpose communications package, *Relay Silver*, into *Relay Gold 3.0*. The program's new features include expanded memory support, multiple sessions, new terminal emulations, and enhancements to *Relay Gold 2.0*'s script language. *Relay Gold 3.0* has features on a par with those of *Crosstalk Mk. 4* and *Smartcom III*, but at only 192K of RAM re-

In *Relay Gold 3.0*, you initiate dialing from an off-line "Directory of Computers." Just place the cursor under the name of the service you want, and press the <F1> key.

quires far less memory. Alas, despite the addition of a new file compression algorithm, *Relay Gold 3.0*'s file transfer times were quite uneven in NSTL tests, often lagging behind *Relay Silver*'s.

Relay Gold 3.0 shares with version 2.0 a background communications mode that won't crash your system, a flexible scripting language, and an interface that can be used by just about anyone. New in *Relay Gold*'s dialing directory are IBM 3101 terminals, DEC VT/220/240 terminals, and an option for running an IRMA card connected to the mainframe with coaxial cable.

In version 3.0, *Relay Gold*'s scripting language gains some debugging commands and the ability to create pop-up menus for monitoring the progress of file transfers. New commands and functions allow a user to download data invisibly and import it directly into 1-2-3, for example, without ever leaving the spreadsheet. *Relay Gold 3.0*'s English-like scripting language is easier to use than *Crosstalk*'s CASL and offers better error trapping. And its new menuing capability surpasses those of *Crosstalk Mk. 4* and *Smartcom III*.

Relay Gold 3.0's proprietary file transfer algorithm supposedly saves time by compressing files during transmission, instead of before. But *Relay Gold 3.0*'s proprietary protocol performed well only in NSTL file transfers involving errors and delays, which suggests it would work acceptably on noisy phone lines.

With *Relay 3270* on the company mainframe you can dial up the mainframe through regular phone lines, a handy feature if your staff includes a field sales force equipped with laptops that don't accommodate 3270 emulation cards.

If you need a telecommunications package to connect PCs with an IBM mainframe, *Relay Gold 3.0* would be a good buy. But its slow file transfers make it hard to recommend to anyone who's in a hurry. —Ken Smith

Directory of Computers				
Name	Telephone Number	Speed	Type	Notes and Comments
3101	203-978-3245	1200	3101	MODEL: IBM 3101 model 16
3101B	203-876-7554	1200	3101B	MODEL: IBM 3101 model 28
3278	512-954-1237	NONE	COAX	MODEL: 3278 emulation board
A HOST	783-444-6754	1200	TTY	MODEL: Full duplex host
A PC	213-879-1234	1200	RELAY	MODEL: PC running Relay
CIS	415-543-1560	1200	TTY	MODEL: CompuServe direct
COMPSERV	415-978-3281	1200	TTY	MODEL: CompuServe
DIALCOM	415-221-3645	1200	TTY	MODEL: ITT Dialcom
DOWJONES	415-394-9887	1200	TTY	MODEL: Dow Jones News
EASYSLINK	408-978-3217	1200	TTY	MODEL: EasyLink

Use PgDn and PgUp to scroll the Directory. Press ENTER when finished.

F1 = Call Name at Cursor	F2 = Answer Name at Cursor
F3 = Add a New Name in Directory By Copying Entry at Cursor	F4 = Review Connect Options for Name at Cursor

Esc = Quit F10 = HELP

RELAY Gold 3.0 10/16/88 19:11 82 Line 05 Column 01

WHERE TO BUY

Relay Gold 3.0
 Relay Communications
 41 Kenosic Ave.
 Danbury, CT 06810-9990
 203/798-3900

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Full Name _____	
Street Address _____	
City/State/Zip _____	
Daytime Phone Number _____	Evening Phone Number _____
Disk Size <input type="checkbox"/> 5 1/4 <input type="checkbox"/> 3 1/2	
Enclosed is my \$29.95 payment. I'm paying by	
<input type="checkbox"/> MasterCard <input type="checkbox"/> Visa <input type="checkbox"/> Check	
Credit Card # _____	Exp. Date _____
Signature of Cardholder _____	
Mail to: PC-Link 8619 Westwood Center Drive Suite 200 Vienna, VA 22180	
3185	

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*Rates higher during business hours and outside continental United States. **Evening and weekend usage rate of 10 cents per minute applies. ***Requires PC-compatible computer with at least 384K RAM, MS-DOS version 2.11 or higher, a Hayes-compatible modem, and a MasterCard, Visa, or checking account for registration. PC-Link is a registered trademark of Quantum Computer Services, Inc. Grolier's Academic American Encyclopedia is a trademark of Grolier's Electronic Publishing, Inc. USA Today is a registered trademark of Gannett Company, Inc. EAASY SABRE is a service mark of SABRE Travel Information Network. MS-DOS is a registered trademark of Microsoft Corporation.

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NSTL TEST REPORT

Relay Gold 3.0: Pokey File Transfers




Relay Gold 3.0 turns in a patchy performance next to Crosstalk Mk.4 and the program it replaces, Relay Silver.

Protocol




Proprietary

Relay Silver		10.1
Crosstalk Mk.4		17.8
Relay Gold 3.0		18.1

Kermit

Relay Silver		18.2
Relay Gold 3.0		18.4
Crosstalk Mk.4		24.4




Checksum XMODEM

Crosstalk Mk.4		16.1
Relay Silver		16.4
Relay Gold 3.0		16.7



seconds 0 5 10 15 20 25

Protocol/error




Proprietary

Relay Gold 3.0		37.5
Crosstalk Mk.4		39.8
Relay Silver		44.6

Kermit

Relay Gold 3.0		24.4
Crosstalk Mk.4		44.7
Relay Silver ¹		

Checksum XMODEM

Crosstalk Mk.4		26.1
Relay Silver		189.9
Relay Gold 3.0		229.5

seconds 0 10 20 30 40 50

Protocol/delay

Proprietary

Relay Silver		13.5
Relay Gold 3.0		19.9
Crosstalk Mk.4		59.3

Kermit




Crosstalk Mk.4		30.9
Relay Gold 3.0		107.5
Relay Silver		108.6

Checksum XMODEM

Relay Gold 3.0		92.6
Crosstalk Mk.4		93.6
Relay Silver		93.7

seconds 0 20 40 60 80 100

No protocol

Crosstalk Mk.4		31.9
Relay Silver		38.4
Relay Gold 3.0		48.5

seconds 0 10 20 30 40 50

¹ Could not perform this test.

All tests were performed on a pair of IBM PC XT's connected by null modem cables to an IBM AT running Combench, a transmission emulation program. Tests consisted of the transmission of a 10K file at 9600 bps. Prior to testing, each hard disk was formatted and DOS 3.2 was installed in its own direc-

tory. A CONFIG.SYS file was then created in the root directory, specifying FILES=20 and BUFFERS=25. Finally, the communications program was installed in its own directory according to the manufacturer's instructions. The identical program and version number were used on each computer, but to maintain the integrity of our tests, the program serial numbers were different. In tests using protocols, each program was run with Kermit and Checksum XMODEM. Although these protocols are not universal standards, most communications programs support them. The proprietary protocol included with each was also tested.

Protocol

The program transmitted a 10K text file at 9600 bps with Checksum XMODEM and Kermit.

No protocol

The program was set to display each character as it was echoed from the host (remote echo).

Protocol/error

A 10K text file was transmitted, and errors were inserted in the transfer at the rate of 1 character dropout and 1 changed byte per 1500 characters.

Protocol/delay

For this test, characters were delayed approximately .5 second between computers.

Data based on tests designed and conducted by National Software Testing Laboratories (NSTL). All rights reserved.

List price: \$295, upgrade from Relay Gold 1.0 and 2.0 \$75 (free if version 2.0 was purchased after May 16, 1988), upgrade from Relay Silver \$95; five-user network version \$825, additional nodes \$115; server upgrade \$75, each node \$25, manual \$20

Requirements: 192K, DOS 2.0 or later version

Technical support: unlimited, no toll-free number, M-F 8-5

Other support services: BBS, quarterly newsletter free to registered users

For more information, circle 625 on reader service card.

Alan Southerton wrote Programmer's Guide to the OS/2 Presentation Manager (Addison-Wesley, Redding, Massachusetts, 1989).

Michael Covington is a researcher with the Advanced Computational Methods Center at the University of Georgia in Athens. Steve Roth is the editor of Real World PostScript (Addison-Wesley, Redding, Massachusetts, 1988). Judy Getts is a contributing editor for PC World. Ken Smith is a PC engineer at Hewlett-Packard in Mountain View, California. ●

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"You might think that a RAM resident spreadsheet would necessarily be limited in features. We found that Lucid 3-D is anything but limited in power." INFOWORLD

"Lucid 3-D is a package that could alter the face of future spreadsheets. It offers residence, multiple windows, colour, mouse support and rapid execution." PC USER

Version 2.0 is Even More Amazing!

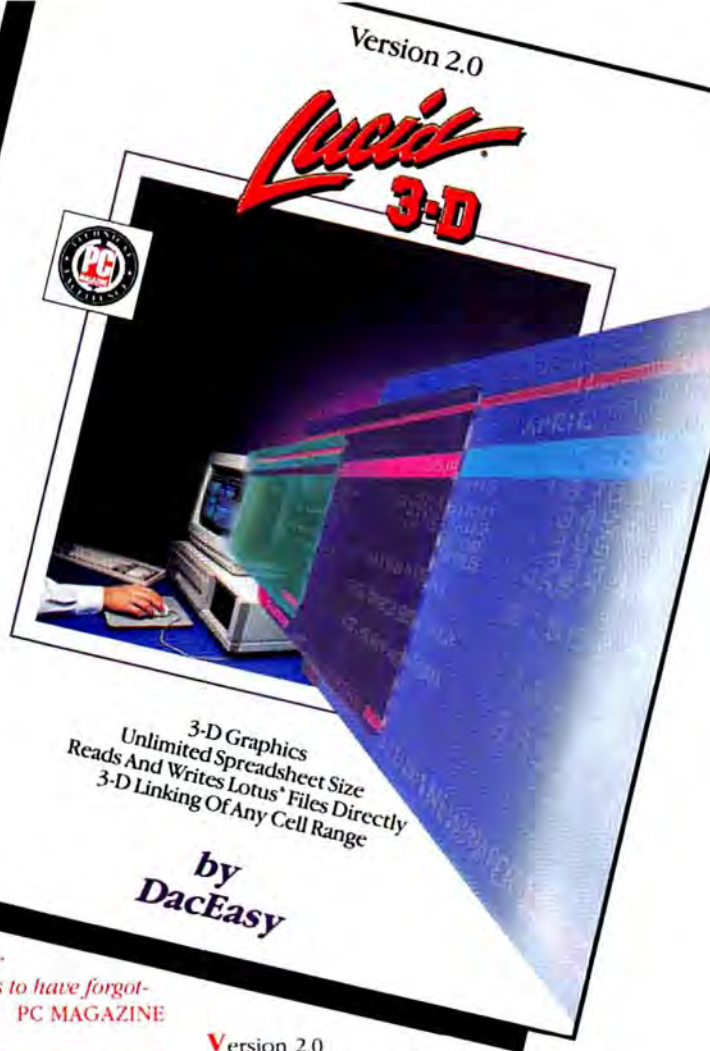
Lucid 2.0 has vastly improved speed of recalculation of 3-D models due to the minimal 3-D recalc. Huge megabyte models with complicated linking

which would have taken over an hour now takes less than a minute! Version 2.0 can now accept files as big as RAM (up to 8 megabytes) with models as large as allowable disk space. Lucid 2.0 can now read and write 1-2-3 and dBase files directly.



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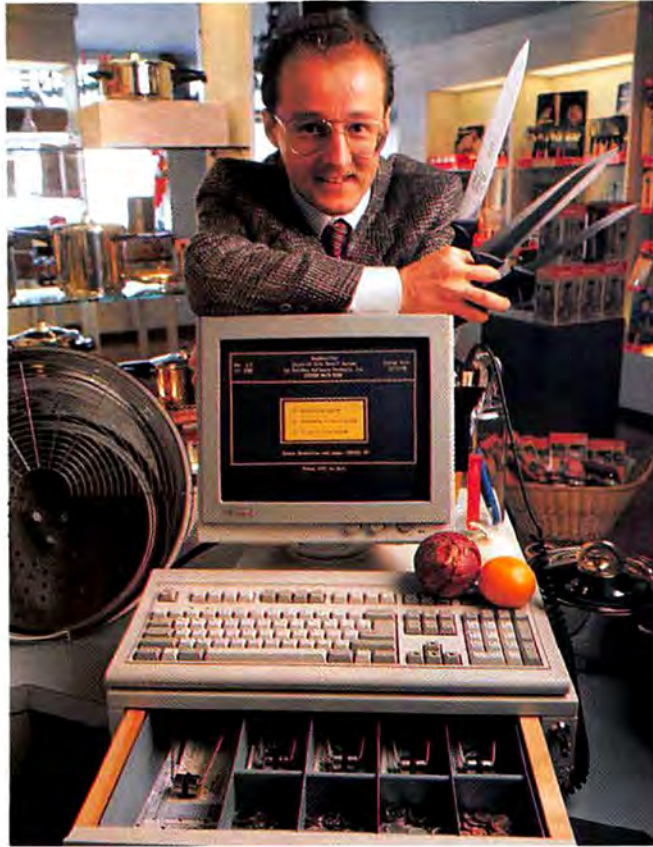
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Checking Out Point-of-Sale Systems

R o n n i e G u n n e r s o n

Affordable point-of-sale (POS) PC systems are revolutionizing Main Street America. From hardware stores to yogurt shops, retailers are tracking their inventory as they ring up sales, and the dramatically improved flow of information has helped some businesses multiply in size. As in any revolution, some foot soldiers have become casualties, but believers still outnumber cynics.

For well under \$1000, off-the-shelf software running on PCs plugged into cash drawers and receipt printers automatically captures and records transactions as they happen. Once this seemingly prosaic information is stored, retailers can pull reports detailing everything from the number of pickles sold daily to the bushels of potatoes Customer X bought this year. That means mom-and-pop retailers can manage inventory as deftly as J.C. Penney and Sears.

Well, almost. Many retailers are finding it difficult or impossible to link their new systems to their accounting operations. Getting POS numbers into their general ledgers sometimes requires rekeying the data. Additionally, a few retailers have been shell shocked by glitches in their packages. Inexpensive POS systems are still proving themselves, so finding the right system and the right supplier is critical.

First, the Good News

Sam Feizi of Balboa Office Supply in San Diego is among the satisfied converts. In 1986, with a 32,000-item inventory to manage, Feizi was looking for a POS system that was as fast and easy to use as possible. Chuck Atkinson Programs delivered, Feizi says. "There are no complications, and the program menu is standardized across all modules." He paid \$699 for Atkinson's *Quick Register* POS program and \$195 for the *Quick Check* accounting program. He runs them on a Novell network composed of an Epson Equity III Plus file server and four XT workstations.

Feizi says the system has increased his company's productivity at least fourfold—"probably more." Before POS, his inventory was divided into ten departments and he tracked sales manually. Now the inventory is broken down into 32 departments, and he retrieves information that he just couldn't get before.

Each evening, Feizi pulls a sales-tax report, a cost-of-goods-sold report, and detailed summaries of each department's invoices. He can also break down department sales by item, vendor, and salesperson, as well as by individual customer activity and both daily and year-to-date dollar sales vol-

ume. Every month he generates reports on back orders, stock status, and dead inventory. The system generates invoices and posts payments at the point of sale.

About the only thing the Atkinson system doesn't do is general ledger accounting, which is available in most other POS packages but is not yet widely used by mom-and-pop retailers. Feizi, however, would like it: "It would be much nicer to have double-entry accounting integrated with the point-of-sale system." As it is, he spends about an hour a day rekeying data into an accounting program from another supplier.

Feizi had no problem installing his system, although it took three months for three people to convert from a manual setup. Since Balboa Office Supply is also a computer dealer, technical support isn't the issue for Feizi that it is for most retailers.

Support was a much taller hurdle for Dave Cole of Action Hobbies in Tulsa, who admits that he "could hardly format a disk" when he bought *Quick Register* four years ago. Still, he was brave enough to order the software through the mail, after reviewing the company's \$20 demo disk.

After 15 years in business, Cole doubled sales in his first year of automation. "It would not have been possible without the software," Cole says flatly. He runs *Quick Register* on an XT clone.

One off-the-shelf package, *The General Store* by Crichlow Data Sciences, proved so easy to use that it made a computer dealer out of a hardware store owner. Sam Frazier III, owner of Sam's Home Center in Chester, South Carolina, is another retailer who shopped by mail two years ago. He bought the \$1200 software on the basis of price, and runs it on a Novell network using a Wyse AT as a file server and two XTs.

Frazier's main concern was that *The General Store* wouldn't be fast enough on XTs, but he claims the program "pulls up data almost instantaneously, even with an item file of 5 million bytes." Overall, he was so impressed that he began selling *General Store* networks on the side.

"I've had days when I would have loved to throw the whole thing out," grouses one retailer.

Rudy Keller (pictured far left) of the Swiss Kitchen in Greenbrae, California, has had a tortuous experience with his software.



His POS software so impressed Sam Frazier of Sam's Home Center that he became a computer dealer.

Now, the Bad News

According to Frazier, POS software is well worth its one agonizing price—tedious data entry. Other retailers only wish that data entry were their worst problem.

One battle-scarred user recalls only nightmares with her POS system. "I wanted to blow it up," fumes Barbara Lambert, who runs a chain of clothing stores called Cotton Comfort headquartered in Dallas. Just over a year ago, the chain installed an IBM System 36 minicomputer at headquarters and Epson PCs loaded with proprietary POS software in all 16 stores. "About halfway through the project, I realized that the software wouldn't do what we wanted," recalls Kass Larson, then MIS director of Cotton Comfort. Larson began converting to *Xtrasoft*.

Unfortunately, Cotton Comfort filed for Chapter 11 protection and closed half its stores. New stores will open in 1989 under the name of True Colors, but they will be managed manually and reports will be submitted by fax machines. "That way I can be sure the information is accurate," says Lambert, who was too frustrated with POS systems to try again.

She has a soul mate in Rudy Keller, owner of the Swiss Kitchen gourmet shop in Greenbrae, California. Keller had high hopes for SoftKey Software Products' *KeyRetailer*, which he bought last April, along with an AT clone, a cash drawer, and a Star Micronics receipt printer. But he soon was complaining, "I can't believe such a program goes out to the public." Keller found so many bugs that SoftKey finally refunded \$500 of the \$2000

purchase price. "I have had days when I would have loved to throw the whole thing out," he grouses.

KeyRetailer upgrades, however, solved many of Keller's problems. "Lots of features in the system are good, and some are very good," Keller says now. SoftKey president Kevin O'Leary, who visited Swiss Kitchen to investigate the difficulties, adds that POS systems take time and training. "What Rudy might have perceived as technical problems are installation issues," he claims.

A Menu for Growth

Venture Development Corporation in Wellesley, Massachusetts, estimates that the retail POS market—including systems for large machines—is growing by 30 percent annually. Venture analyst Leone Johnson says specialty stores are experiencing the highest growth in PC system shipments. But the restaurant industry remains the largest market, and it's one of the first outposts for electronic cash register manufacturers that are making the transition to PCs.

One such supplier, TEC America, released its PC-based FT-40 last summer, selling its first systems to a chain of 175 yogurt shops called I Can't Believe It's Yogurt. The FT-40 lists for \$2995 and includes CPU, monitor, receipt printer, and point-of-sale keyboard. The yogurt chain still offers franchisees a \$4500 electronic cash register, but not one has been ordered since the PC-based system shipped. "It's a function of versatility and price," says Buddy Harvey, the chain's operations director.

The Custom Counter

Like other cash register suppliers, TEC America sells primarily through its distributors, but most specialty retailers don't want to buy that way. Apart from the bold few who order software by mail, most retailers look to buy from value-added resellers of computer systems. Retailers with multiple stores, in particular, usually want resellers to customize programs, notes Jerry Paul of The Flagship Group, a Dallas market research firm.

Customization is particularly important to video stores, since most of their business in-

volves rentals rather than sales. Applause Video of Omaha is a case in point. Working with local reseller Information Management Consultants, Chief Financial Officer Joe Riha developed the Diamond Video Management System, which saves Applause 20 percent in labor costs.

Each of Applause's 21 stores has a Novell network with three to seven workstations (each with a bar-code reader) and an AT-compatible file server.

When a customer rents a movie, the sales clerk can call up the customer file by video club membership number, phone number, first name, or last name. The clerk uses the bar-code reader to check the package in or out, and each package has a unique bar-code number.

Transaction data is automatically uploaded to ATs at headquarters every night, letting corporate management pull up to 25 different reports the next day. But even Applause's sophisticated system doesn't integrate general ledger accounting.

Looking for Mr. Good Bar Code

To find the right POS system, look first in your own backyard. Call your industry's trade association and attend its annual convention. Broad-based groups like the National Association of Retail Dealers of America in Chicago, the National Retail Merchants Association in New York City, and the Association of General Merchandise Chains in Washington, D.C., are also good sources.



Once you develop a list of prospective suppliers, grill them. Find out the background of the software developer. You want someone with retail experience, preferably in your industry. And you want a system that's been tested by retailers.

Try to speak with retailers similar to yourself, Riha advises. If you operate a regional chain with stores in suburban strip malls, you want to know how well the system operates in that environment. This may take a lot of phone calls, but the up-front research should save you the frustrations Rudy Keller and Barbara Lambert suffered.

Better you should wind up like Jerry Paul's shoemaker. "He uses a POS system to run a two-employee shop, and he loves it!" ●

Ronnie Gunnerson is a Los Angeles-based writer and frequent contributor to PC World.

POS accounting increased productivity at Balboa Office Supply fourfold, claims Sam Feizi.

WHERE TO BUY

Diamond Video Management System

Information Management Consultants
10824 Old Mill Rd. #7
Omaha, NE 68154
800/234-1685

List price: \$2295
Requirements: 640K, DOS 3.0 or a later version, 30MB or greater hard disk
For more information, circle 610 on reader service card.

FT-40

TEC America
2150 W. 190th St.
Torrance, CA 90504
213/320-8900

List price: \$2995
For more information, circle 611 on reader service card.

The General Store

Crichlow Data Sciences, Inc.
P.O. Box 6420
Virginia Beach, VA 23456
804/426-7628

List price: \$995

Requirements: 640K, DOS 2.1 or later version, hard disk

For more information, circle 612 on reader service card.

KeyRetailer

SoftKey Software Products Inc.
260 Richmond St. W #300
Toronto, Ontario M5V 1W5 Canada
416/598-5033
List price: \$2000

Requirements: 640K, DOS 2.0 or a later version, hard disk

For more information, circle 613 on reader service card.

Quick Register

Chuck Atkinson Programs
3737 Ramona Dr.
Fort Worth, TX 76116
817/560-7007

List price: \$699
Requirements: 256K, DOS 3.1 or later version

For more information, circle 614 on reader service card.

Xtrasoft

Xtrasoft Inc.
4701 Patrick Henry Dr. #2101
Santa Clara, CA 95054
408/986-9872

List price: \$2995
Requirements: 640K, DOS 3.1 or later version
For more information, circle 615 on reader service card.

PC AND XT ACCELERATOR BOARDS

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ROBERT LUHN

There are a hundred ways to speed up a PC or XT. You can add more system memory, use RAM disk and disk caching software, get a speedier hard disk, or if you're flush, replace the PC's aged motherboard with a form-fit 80386 motherboard.

But for most PC users, an accelerator or "turbo" expansion board built around an 80286, or in some cases an 80386, delivers the biggest boost for the buck. Some of the faster 286 boards—such as the MicroWay Super-Cache-286 and AST Hot Shot/286—can boost XT operation by 200 to 500 percent; 386-based boards can add as much as 1000 percent. Installation is usually straightforward: Pull out the PC's 8088, pop the turbo board into a slot, and connect it to the empty 8088 socket with a special plug. Some boards, like the 386 HummingBoard, don't replace the PC's CPU but act as high-speed coprocessors. Add a few files, and your PC runs like an AT—and then some.

Just keep in mind that not all turbo boards are cut from the same cloth. Although most of the 286 and 386 boards listed here come with their own RAM and can use a numeric coprocessor,

they vary considerably in performance, expandability, and convenience. Before you buy, consider these factors:

How Fast Is Fast? The faster a processor's clock rate (expressed in megahertz, or MHz), the faster the turbo board, right? Yes and no. The number of wait states (the number of processor cycles required to access RAM) can affect throughput dramatically. That's why a turbo board with a 10-MHz 80286 running at zero wait states is faster than a 12-MHz, one-wait-state board. When in doubt, pick the board with the highest clock rate and the fewest wait states.

Warning: Beware of turbo boards bearing "pushed" microprocessors. In their quest for speed (and a quick buck), some manufacturers take chips rated for a given speed and rev up their clock rates. According to Intel, pushed chips may eventually produce erroneous calculations or simply overheat and self-destruct. Ask the board vendor if the processor is certified by Intel for the advertised speed. Look for the "80286-*xx*" stencil on the microprocessor; the *xx* denotes the maximum clock rate. (For more on pushed chips, see

Consumer Watch, PCW, November 1988.)

Check That RAM Budget turbo boards often rely solely on the PC's sluggish 8-bit memory. You save money this way but sacrifice speed. Look for 286 and 386 turbo boards that pack lots of *socketed* 16- and 32-bit RAM. For extra zip, pick a board that also includes a memory cache—a high-speed static RAM buffer between the CPU and slower system memory.

How much RAM is enough? If you plan to use stand-alone DOS applications, 1MB is fine. If multitasking environments such as *Desqview* and *Windows* are your dish, or you're brave enough to tackle OS/2, you should probably turn to a 386 turbo board that accommodates at least 4MB of high-speed RAM. Users of every stripe should make sure that a turbo board's RAM can be treated as EMS 4.0 memory.

Hardware and Software Compatibility Most turbo boards work uncomplainingly in 8088-based systems. But only a handful run in speed-switchable 8088 machines such as the Leading Edge PC, and fewer still in 8086 machines such as the Compaq Deskpro.

Compatibility with DOS applications is generally assured, although loading older, copy-protected programs may be impossible if you can't downshift the turbo board to 4.77 MHz. Some boards may also have difficulty loading 1-2-3 from a floppy disk, running *R:base for DOS* at high speed, or displaying *Microsoft Word* documents. Note, too, that 386 turbo boards can't automatically run every 386-specific program out of the box. The Intel Inboard 386/PC, for example, chokes on Concurrent DOS/386, VM/386, and PC-MOS/386 and requires a special version of *Windows/386*. When in doubt about a board's compatibility, follow the Golden Upgrade Rule: Call before you buy.

The OS/2 Conundrum If you're buying a turbo board to run OS/2, think again. Unlike DOS, OS/2 is extremely hardware specific: Unless a turbo board is very compatible with the IBM PC AT (like the Sota 286i) or the vendor goes to the pains of modifying OS/2 (as Microsoft did for the Mach 20), you're out of luck. At press time, only Sota and Microsoft supported OS/2.

Extras Make a Difference Finally, don't forget the bundled goodies. A disk caching program can make a big difference in overall system performance, as can RAM disk programs and print spoolers. If you want to simplify your system's future growth, check out boards that offer high-density floppy disk drive controllers. ●

Robert Luhn is a senior editor for PC World and the editor of The Upgrade Path. John Faulkner researched this article.

WHERE TO BUY

A.I. Architects

One Kendall Sq.,
Bldg. 400
Cambridge, MA 02139
617/577-8052

Applied Reasoning Corp.

86 Sherman St.
Cambridge, MA 02140
617/492-0700

AST Research, Inc.

2121 Alton Ave.
Irvine, CA 92714
714/863-1333

ATD Ave.

1150 Morse Ave.
Sunnyvale, CA 94088
800/222-4920,
408/720-1942

Everex Systems, Inc.

48431 Milmont Dr.
Fremont, CA 64538
415/498-1111

Intel Corp.

5200 N.E. Elam Young
Pkwy.
Hillsboro, OR 97124
800/538-3373,
503/629-7402

Microsoft Corp.

16011 N.E. 36th Way
Box 97017
Redmond, WA 98073
800/426-9400,
206/882-8080

Microspeed, Inc.

5307 Randall Pl.
Fremont, CA 94538
415/490-1403

MicroWay, Inc.

P.O. Box 79
Kingston, MA 02364
508/746-7341

Mini Micro Supply Co.

2050 Ringwood Ave.
San Jose, CA 95131
408/434-6859

Mountain Computer, Inc.

240 Hacienda Ave.
Campbell, CA 95008
800/458-0300,
408/379-4300

Ocean Interface Co.

P.O. Box 1666
Monterey Park, CA
91754
818/284-3742

Orchid Technology

45365 Northport
Loop W
Fremont, CA 94538
415/683-0300

PCSG (PC Support Group)

17950 Preston Rd. #800
Dallas, TX 75252
214/404-4000

PC Technologies, Inc.

704 Airport Blvd.
Ann Arbor, MI 48108
313/996-9690

Quadram Corp.

One Quad Way
Norcross, GA 30093
404/923-6666

Seattle Telecom & Data, Inc.

12277 134th Ct. NE
Redmond, WA 98052
206/883-8440

Sota Technology

657 N. Pastoria Ave.
Sunnyvale, CA 94086
408/245-3366

(See chart on following pages.)



PC AND XT ACCELERATOR BOARDS

MANUFACTURER Product	List price (including min. RAM required)	Type/speed	Wait states	Board/ processor replaces PC's CPU	Speed switchable	Numeric coprocessor supported (type/speed)	RAM included	RAM max.	RAM speed (in ns)
A.I. ARCHITECTS									
386 HummingBoard	\$1595	80386/16	0	no	no	80387/16	1MB	24MB	120
386 HummingBoard	\$1995	80386/20	0	no	no	80387/20	1MB	24MB	100
386 HummingBoard	\$2595	80386/25	0	no	no	80387/25	1MB	24MB	80
APPLIED REASONING									
PC-Elevator 386	\$1795	80386/16	0	no	no	80387/16	1MB	13MB	100
AST RESEARCH									
Hot Shot/286	\$545	80286/10	0	yes	yes	80287/8, 10	n/a	n/a	n/a
ATD									
286 Accelerator Board	\$359	80286/12	0	yes	no	80287/5, 8, 12	n/a	n/a	n/a
EVEREX SYSTEMS									
EverTurbo/12	\$409	80286/12	0	yes	yes	80287/10	n/a	n/a	n/a
INTEL									
Inboard 386/PC	\$1095	80386/16	2-4	yes	yes	80387/16	1MB	5MB	120
MICROSOFT									
Mach 20	\$495	80286/8	0	yes	yes	80287/5	0	3.5MB	150
MICROSPEED									
Fast 88, FA-100	\$129	8088-2/8	0	yes	yes ⁴	8087-2/8, 8087-1/10	n/a	n/a	n/a
Fast 88, FA-120	\$149	NEC V20/8	0	yes	yes ⁴	8087-2/8, 8087-1/10	n/a	n/a	n/a
MICROWAY									
FastCache-286	\$199	80286/9.54	n/a	yes	yes	80287/6, 10	n/a	n/a	n/a
FastCache-286	\$299	80286/12	n/a	yes	yes	80287/6, 10	n/a	n/a	n/a
SuperCache-286	\$399	80286/12	n/a	yes	yes	80287/10, 12	n/a	n/a	n/a
Number Smasher/ECM	\$399	8086/10	n/a	yes	yes	8087/10, 12	512K	1MB	150
Number Smasher/ECM	\$599	8086/12	n/a	yes	yes	8087/12	1MB	1MB	150
MINI MICRO SUPPLY									
TurboCache 286	\$495	80286/10	1	yes	yes	80287/6, 8, 10	n/a	n/a	n/a
MOUNTAIN COMPUTER									
Mountain Racecard 286	\$495	80286/10	1	yes	no	80287/5, 8, 10	n/a	n/a	n/a
OCEAN INTERFACE									
286 Speed Card	\$399	80286/10	1	yes	yes	80287/6, 8	n/a	n/a	n/a
ORCHID TECHNOLOGY									
TinyTurbo 286	\$445	80286/8	0	yes	yes	80287/5, 8	n/a	n/a	n/a
TwinTurbo 12	\$645	80286/12	0	yes	yes	80287/6, 8, 12	n/a	n/a	n/a
PCTurbo 286e-10	\$1295	80286/10	0	no	yes	80287/8, 12	1MB	2MB	100
PCSG (PC SUPPORT GROUP)									
Breakthru 286-8	\$395	80286/10	0	yes	yes	80287/6, 8	n/a	n/a	n/a
Breakthru 286-12	\$595	80286/12	0	yes	yes	80287/6, 8, 10	n/a	n/a	n/a
PC TECHNOLOGIES									
286 Express-8	\$275	80286/8	0	yes	yes	80287/6, 8	n/a	n/a	n/a
286 Express-12	\$395	80286/12	0	yes	yes	80287/6, 8, 10	n/a	n/a	n/a
286 Express-16	\$530	80286/16	0	yes	yes	80287/6, 8, 10	n/a	n/a	n/a
286 Express/30-12	\$395	80286/12	0	yes	yes	80287/6, 8, 10	n/a	n/a	n/a
286 Express/30-16	\$530	80286/16	0	yes	yes	80287/6, 8, 10	n/a	n/a	n/a
286 RAMracer	\$345	80286/8	0	yes	yes	80287/6, 8	0	2MB ⁶	150
QUADRAM									
Quad 386XT-16	\$1195	80386/16	0	yes	no	80387/16, Weitek 3167, 1167	1MB	3MB	120
Quad 386XT-20	\$2295	80386/20	0	yes	no	80387/20, Weitek 3167, 1167	1MB	3MB	100
SEATTLE TELECOM & DATA									
PC286-10	\$795	80286/10	0 or 1	yes	no	80287/5, 6, 8, 10	640K	8MB	120
PC286-12.5	\$995	80286/12.5	0 or 1	yes	yes	80287/5, 6, 8, 10	640K	8MB	100
STD3270PC	\$995	80286/10	0 or 1	yes	yes	80287/5, 6	640K	8MB	120
SOTA TECHNOLOGY									
286i	\$395	80286/10	0	yes	yes	80287/5, 8, 10	0	4MB	100
286i	\$495	80286/12.5	0	yes	yes	80287/5, 8, 12.5	0	4MB	100

n/a = not applicable

¹ Legend
R = RAM disk program
D = disk cache program
P = print spooler

² Limited to cache, RAM disk, or print spooler.
³ Only via OS/2.
⁴ Hardware switch, \$20 extra.

⁵ Supports only EMS 3.2.
⁶ EMS 4.0 memory only.

RAM chips socketed	Supports EMS 4.0	Supports extended memory	RAM cache (in K)	Supports OS/2	Works in dual-speed 8088 machines	Works in 8086 machines	Uses PC's motherboard memory	Disk controller option	Bundled utilities ¹	Initial warranty	Extended warranty	Toll-free technical support	Reader service number
yes	yes	yes	12	no	yes	yes	yes	no	n/a	1 year	no	no	720
yes	yes	yes	12	no	yes	yes	yes	no	n/a	1 year	no	no	720
yes	yes	yes	12	no	yes	yes	yes	no	n/a	1 year	no	no	720
yes	yes	yes	n/a	no	yes	yes	yes ²	no	R, D	1 year	yes	no	721
n/a	yes	yes	16	no	yes	no	yes	no	R, P	2 years	no	no	722
n/a	no	no	8	no	yes	no	yes	no	D	2 years	no	no	723
n/a	yes	no	8	no	yes	no	yes	no	n/a	1 year	no	no	724
no	yes	yes	n/a	no	yes	no	no	no	D	5 years	no	yes	725
yes	yes	yes ³	16	yes	yes	no	yes ²	yes	D	2 years	no	no	726
n/a	yes	yes	n/a	no	no	no	yes	no	n/a	1 year	yes	no	727
n/a	yes	yes	n/a	no	no	no	yes	no	n/a	1 year	yes	no	727
n/a	yes	yes	8	no	yes	no	yes	no	R, D, P	1 year	no	no	728
n/a	yes	yes	8	no	yes	no	yes	no	R, D, P	1 year	no	no	728
n/a	yes	yes	32	no	yes	no	yes	no	R, D, P	1 year	no	no	728
no	yes	yes	n/a	no	no	no	yes	no	R, D, P	1 year	no	no	728
no	yes	yes	n/a	no	no	no	yes	no	R, D, P	1 year	no	no	728
n/a	yes	yes	8	no	no	no	yes	no	R, D, P	1 year	no	no	729
n/a	no	no	8	no	no	no	yes	no	n/a	1 year	no	no	730
n/a	no ⁵	yes	8	no	yes	no	yes	no	R, D	1 year	no	no	731
n/a	yes	no	8	no	no	no	yes	no	n/a	4 years	no	no	732
n/a	yes	no	8	no	yes	no	yes	no	R, D, P	4 years	no	no	732
no	no	yes	n/a	no	yes	yes	yes ²	no	R, D, P	4 years	no	no	732
n/a	yes	no	16	no	yes	no	yes	yes	D	1 year	no	no	733
n/a	yes	no	16	no	yes	no	yes	yes	D	1 year	no	no	733
n/a	yes	no	8	no	no	no	yes	no	n/a	2 years	no	yes	734
n/a	yes	no	16	no	yes	no	yes	no	n/a	2 years	no	yes	734
n/a	yes	no	16	no	yes	no	yes	no	n/a	2 years	no	yes	734
n/a	yes	no	16	no	yes	yes	yes	no	n/a	2 years	no	yes	734
n/a	yes	no	16	no	yes	yes	yes	no	n/a	2 years	no	yes	734
n/a	yes	no	8	no	no	no	yes	no	R, D, P	2 years	no	yes	734
no	yes	yes	yes	no	yes	no	yes	no	R, P	1 year	no	no	735
no	yes	yes	n/a	no	yes	no	yes	no	R, P	1 year	no	no	735
yes	no ⁵	yes	n/a	no	yes	no	no	no	R, D, P	1 year	yes	no	736
yes	no ⁵	yes	n/a	no	yes	no	no	no	R, D, P	1 year	yes	no	736
no	no ⁵	yes	n/a	no	yes	no	no	no	R, D, P	1 year	yes	no	736
no	yes	no	16	yes	yes	yes	yes	yes	R, D, P	2 years	no	yes	737
no	yes	no	16	yes	yes	yes	yes	yes	R, D, P	2 years	no	yes	737

Lasersharp R:base Reports

Use printer variables and escape sequences to print good-looking, formatted reports directly from R:base—

with your HP LaserJet or compatible printer.



Karen
Watterson

Do you remember the hollow feeling in the pit of your stomach when you first looked in your LaserJet printer manual and glimpsed the long, complicated escape sequences that select printer features? If you're like most of us, the first thing you did was install a canned LaserJet driver for your word processing program, and let the driver worry about sending all those codes for font changes, landscape printing, box creation, and so on.

Then you tackled Microrim's *R:base*, which has no LaserJet driver—or any other printer driver, for that matter. To print a report using custom print options, you must include the escape codes in the report itself.

Fancy Fontwork

Print options that won't change during printout can be set once before you print, via the control

panel (if your LaserJet compatible has one), or a printer setup program (if it doesn't). But if you want to do any fancy fontwork in your *R:base* report—or use shading, lines, or boxes—you'll have to master LaserJet escape sequences.

Some escape sequences must be sent to the printer exactly as you see them in the manual; others include a # as a placeholder, indicating that you must fill in a value. However, in no case can you simply type the escape codes into your report; you must translate them into *R:base*-ese by defining and locating *printer variables* with Reports Express, *R:base*'s report generator.

Landscape Printing Tutorial

Because data base reports are often tabular, the ability to print

them in landscape mode is essential. Your printer manual probably lists the necessary escape sequence as follows:

Select Landscape Mode `^C &110`

This means that if you want to print in landscape mode, you have to send the printer the Escape character (`^C`) followed by the characters `&110`.

To translate this escape sequence into an *R:base* printer variable, follow this procedure:

1. From the `R>` prompt, type **Reports** and press `<Enter>` to bring up Reports Express.

2. Choose a data base (unless you already have one open).

3. Choose *(1) (Edit/Create a report)* from the Report Options menu.

4. If you already have reports created, select the one to edit. If you want to create a new one, choose *(New)* from the Choose a report menu. If you choose *(New)* (or if you have never created a report with this data base), you will be prompted to give the report a name and to select the table or view on which it will be based. Once you do so, you will move automatically into the Report Definition menu.

5. Select *Expression* from the Report Definition menu.

6. Select *Define* from the Expression menu.

7. Type `land = <27 38 108 49 79>` and press `<Enter>`. The numbers inside the angle brackets are the decimal ASCII codes for Escape (ASCII 27), ampersand, lowercase *l*, the numeral one, and uppercase *O*.

8. Press `<Esc>` to redisplay

Reset printer to default	<code>^CE</code>	<code><27 69></code>
Specify landscape orientation	<code>^C&110</code>	<code><27 38 108 49 79></code>
Specify portrait orientation	<code>^C&100</code>	<code><27 38 108 48 79></code>
Compressed print, e.g., line printer	<code>^C(s16.66H</code>	<code><27 40 115 49 54 46 54 54 72></code>
Use legal paper from legal tray	<code>^C&l84P</code>	<code><27 38 108 56 52 80></code>
Use legal paper from legal tray (Series II)	<code>^C&l3A</code>	<code><27 38 108 51 65></code>
Specify soft font defined as font 1	<code>^C(1X</code>	<code><27 40 49 88></code>
Italics on	<code>^C(s1S</code>	<code><27 40 115 49 83></code>
Italics off	<code>^C(s0S</code>	<code><27 40 115 48 83></code>
Underline on	<code>^C&d3D</code>	<code><27 38 100 51 68></code>
Underline off	<code>^C&d0</code>	<code><27 38 100 64></code>
Print 2 copies (50 is ASCII for 2)	<code>^C&l2X</code>	<code><27 38 108 50 88></code>
Print 8 vertical lines per inch	<code>^C&l8D</code>	<code><27 38 108 56 68></code>

FIGURE 1: Popular escape sequences translated into *R:base* report variables

the Expression menu. Press `<Esc>` again to redisplay the Report Definition menu.

Now you need to decide where in your report you want the landscape command to take effect. Since you will rarely want to change page orientation within the body of a report, the main choices have to do with using different options for cover sheets and page headings.

Information to appear on the cover sheet is entered on RH (Report Header) lines; information to appear at the top of every page is entered on PH (Page Header) lines.

Let's assume you want to print page 1, the cover sheet, in normal mode, and the rest of the report, starting with page 2, in landscape mode.

9. Select *Edit*.

10. If this is a new report, or if you've previously created a report header, your cursor will probably already be on an RH line; otherwise, check the status line, press `<F9>` to toggle Expand on if necessary, and use `<F7>` to create an RH line.

Then type cover sheet text on the RH line(s).

11. When you're finished entering the cover sheet text, press `<F8>` to move into the Page Header section. The cursor will be on a PH line. Even if you do not plan to use any page headers, you can still place your printer variable here.

12. To place the variable "land" in the report, press `<F6>` `<Enter>` `<Enter>`, and then select *Land* from the Locate variable menu. Press **S** and **E** in response to the prompt; there's no need to move the cursor. Type any text you want to appear as a page header, making sure to indent for margins.

13. When you've finished entering your page header text, press `<Enter>` one or more times to insert blank lines between the header and the Detail section. `<F8>` moves you into the Detail section. With the cursor on a D line, press `<F6>` to begin locating fields from your data base on the report layout.

14. Press <F8> to move into Page Footer and Report Footer sections, if desired. You should also define a "reset" variable (see FIGURE 1) and locate it on the last RF (Report Footer) line. This will return your printer to portrait mode at the end of the print cycle.

15. When you've finished, press <Esc> and select *Configure* from the Report Definition menu.

16. Change the FORM FEEDS After Report Header setting from NO to YES to start landscape printing on a new page.

17. Press <Esc> twice to move to the Report Exit Options menu.

18. Press <Enter> to save changes.

19. Select (6) to exit.

That's it. Now when you tell *R:base* to OUTPUT PRINTER and PRINT *rptname*, it will start printing the report; when it encounters the variable "land," it will send the escape sequence that tells the printer to shift to landscape mode. Voilà!

FIGURE 1 lists some escape sequences for selecting fonts and other popular features. You can place these variables on RH or PH lines. You can also place printer variables on Break Header (H1, H2...) or Break Footer (F1, F2...) lines to invoke, or turn off, fonts or effects for new sections.

Creating a Report With Shaded Rectangles and Custom Lines

Suppose you want to jazz up the first page of an otherwise uninspiring summary report of sales data so that it looks like FIGURE 2, complete with shaded rectangles

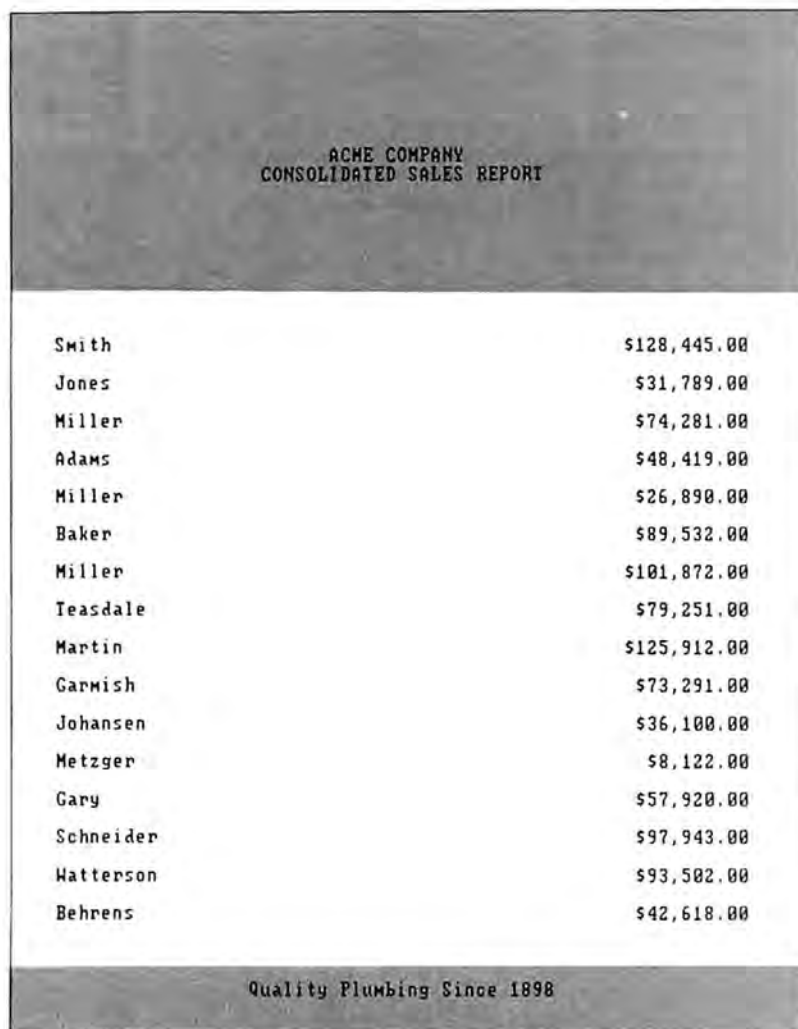


FIGURE 2: An R:base sales report printed with lines and shaded rectangles

and custom lines. (You'll need at least a LaserJet Plus for these effects.)

We'll use a combination of three escape sequences:

`^c*p#x#Y` To position the cursor at location #,#.

`^c*c#a#b0P` To draw a line #

dots wide and # dots high.

(Note: If the value for the first # is greater than the second #, the line is horizontal; if the value for the second # is greater, the line is vertical.)

`^c*c#a#b#g#P` To draw a box

```

1: TEXT : reset      = <27 69>
2: TEXT : locate1   = <27 42 112 49 53 48 120 49 53 48 89>
3: TEXT : line1     = <27 42 99 50 49 48 48 97 51 98 48 80>
4: TEXT : box1      = <27 42 99 50 49 48 48 97 55 48 48 98 49 48 103 50 80>
5: TEXT : line2     = <27 42 99 51 97 50 55 48 48 98 48 80>
6: TEXT : locate2   = <27 42 112 50 50 53 48 120 49 53 48 89>
7: TEXT : locate3   = <27 42 112 49 53 48 120 50 55 48 48 89>
8: TEXT : box2      = <27 42 99 50 49 48 48 97 49 53 48 98 49 48 103 50 80>
9: TEXT : locate4   = <27 42 112 49 53 48 120 50 56 53 48 89>
    
```

FIGURE 3: R:base printer variables used to produce the report in FIGURE 2

dots wide by # dots high with # percent shading and # type of fill.

FIGURE 3 shows pretranslated *R:base* printer variables for the report in FIGURE 2, based on these escape sequences. "Locate1" positions the cursor at 150,150 (½ inch down and ½ inch in from the top-left corner; remember, the LaserJet prints 300 dots per inch). "Line1" directs the printer to print a horizontal line 2100 dots (7 inches) long and 3 dots thick. "Box1" draws a 10 percent gray-scale shaded box 2100 by 700. "Line2" prints a vertical line 2700 dots high and 3 dots thick. "Locate2" positions the cursor at 2250,150. "Locate3" positions the cursor at 150,2700. "Box2" draws a 10 percent gray-scale shaded box 2100 by 150. "Locate4" positions the cursor at 150,2850.

Creating a Printer Variable With Replaceable Parameters

As an exercise, here are step-by-step instructions for creating one of the variables with replaceable parameters, "locate1." This will position the cursor at 150,150.

1. Write down the original escape sequence:

```
ESC * p # x # Y
```

2. Substitute data:

```
ESC * p 150 x 150 Y
```

3. Referring to an ASCII table, convert the characters

```
ESC * p 1 5 0 x 1 5 0 Y
```

to decimal ASCII codes:

```
27 42 112 49 53 48 120 49 53 48 89
```

4. Using Reports Express, define the expression "locate1" as a TEXT variable by entering the code from step 3: `locate1 = <27 42 112 49 53 48 120 49 53 48 89 >`

Once you've defined all the variables in FIGURE 3, use Reports

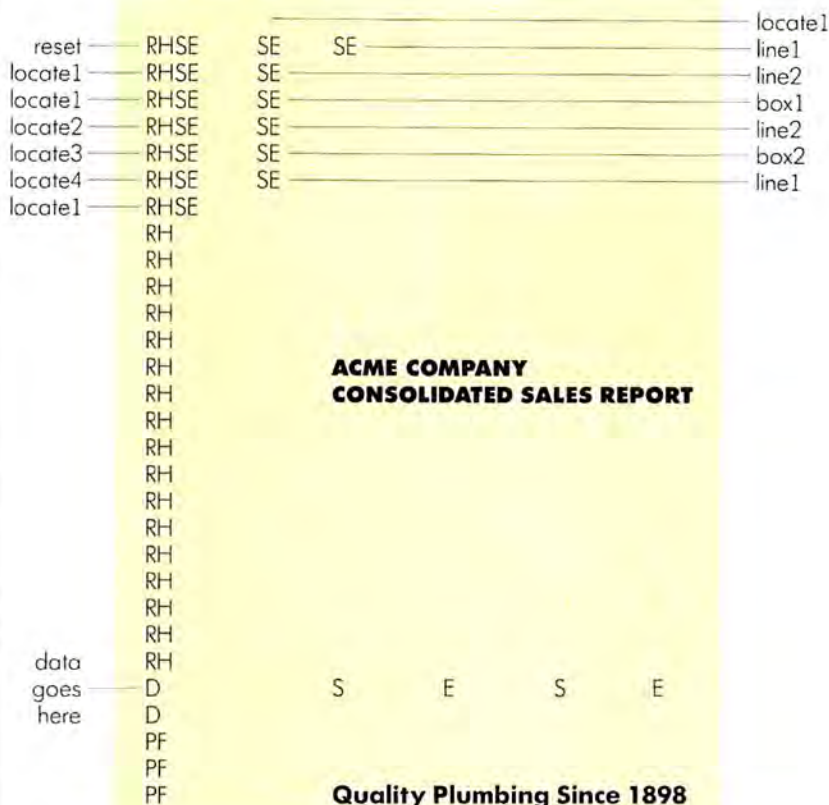


FIGURE 4: Placement of R:base printer variables used to produce the report in FIGURE 2

Express to locate them on RH lines in your report, following the procedure previously outlined for locating the variable "land." Proper location is shown in FIGURE 4.

A Few Final Thoughts

Make sure your printer offers a certain feature before you spend fruitless hours trying to figure out why your escape code isn't working. It won't do any good to send an escape sequence to select 24-point characters if your printer has no 24-point fonts.

Don't let your pride keep you from considering an end run. Since *R:base* lets you send a report to a disk file, one way to customize a report is to save it to a file and then edit it with a word

processing program that has its own LaserJet printer driver.

Finally, don't forget to send a NEWPAGE command (from the R> prompt) after printing a report to eject the final page:

OUTPUT PRINTER

```
PRINT rptname
```

```
NEWPAGE
```

OUTPUT SCREEN

Be patient, work carefully, and take your time. Creating, locating, and debugging printer variables can be tedious, but the process puts *you* in control of your LaserJet—rather than the other way around. ●

Karen Watterson teaches computer applications at Shoreline Community College in Seattle and is coauthor of Understanding R:base (Sybex, San Francisco, 1988).

TIPS &
TECHNIQUES

Data Bases

How to Design a Data Base File

Want intelligent answers from a data base? Start by creating an intelligent file structure. A few rules of thumb make it easy.

What you need: any data base management program

If you use a PC to keep records of any kind, you're a data base manager. And unless you want that data base to start managing you, it makes sense to set it up right in the beginning.

This piece will show you how to design a simple, single-file data base that uses a minimum of storage space, is easy to search and sort, and resists careless mistakes. (A future article will cover data bases that consist of multiple, related tables.) The specific examples here

refer to *dBASE*, but the underlying principles are true whatever program you use, anything from *RapidFile* to *Paradox*.

All data base files have a tabular structure. Data is arranged much as it is in a spreadsheet; the column headings are fields, and the rows are records. Designing a data base is mainly a matter of choosing the field names, their widths, and the type of data that goes into them.

Turn Facts Into Fields

Say you've gone to work for the alumni association at your old alma mater, Dagnet University, and you need to track donations to the alumni fund. After a little thought, you decide that to answer the dean's questions, produce reports, and manage a mailing list, you'll need to track a lot of facts about each of the alumni: name, student ID number, class year, address, phone number, degree, department, number of years' membership in the association, yearly income, amount of donation, and donation as a percentage of income.

The items on this list will be only roughly equivalent to the fields in the data base. A few guidelines can help you translate these categories into an array of fields that will yield a bulletproof file structure.

Creating an Optimum Table Structure

When in doubt, break it out! If you're faced with a choice of creating one wide field or several smaller fields, it's always better

to choose the latter. It's much easier to combine small fields into a larger expression later on than to split a large field into smaller pieces.

For just the first line of an address on a simple form letter, you'll need no fewer than six fields: Salutation (Mr., Ms., etc.), First, Middle, Last, Suffix (Jr., etc.), and Nickname. With these, you'll be able to customize the correspondence and sort by last name.

It's a character field unless... Numeric fields are for calculations; date fields are for dates and durations. With few exceptions, everything else should be a character (or text) field. The classic example is Zipcode. Though composed of digits, this is a character field, because zip codes are never used in calculations. (Some data base managers have a special field type for numeric labels.) In the alumni records, Studentid and Phone are also character fields.

Make character fields as wide as necessary but as narrow as possible. Most data base managers reserve the same amount of disk space for each record in a file, whether the fields contain data or not. So watch field length carefully; widening a field even by a character can take up a lot of space in a large data base.

Some character fields must be wide enough for the longest possible entry—name fields, for example. Others can be shortened by means of a coding system. In

the alumni data base's Department field you could use ASTR for Astronomy, for instance. This can also cut data entry errors.

For numeric fields: "A little wider, please." Leave some extra room in numeric fields for later growth and for calculations and subtotals. In our example, Income and Donation are numeric fields.

Include a unique field. Every data base needs a field that uniquely identifies a record: a social security number, part number, transaction number, and so on. Having such a field eliminates confusion between records containing similar data and makes it easy to purge duplicate records. (For the alumni association, the unique field is Studentid.) In more complex relational data base designs, the unique field provides a link between related tables.

Avoid redundant fields. Never include fields that can be derived from the entries in other fields. This saves disk space, since you can always calculate the information when you need it. (This rule will sometimes be violated in complex data base designs created under *dBASE*; other data base managers, such as *DataPerfect*, provide virtual or calculated fields that are stored separately from the data.) In the alumni group system, you don't need a field for donation as a percentage of income, for example; you can perform the Donation/Income calculation wherever the figure is needed.

Use date fields for durations. Don't use a numeric field to show the number of years of an alumnus's membership; you'd only have to update it every year. Instead, create a field called Joined

Records	Go To	Exit
FIRST	Edith	
MIDDLE	P.	
LAST	Brownstone	
SALUTATION	Dr.	
SUFFIX		
NICKNAME	Edi	
STREET	1900 North Adams St.	
CITY	New Brunswick	
STATE	NJ	
ZIPCODE	08421	
PHONE	(516)824-3122	
CLASS	1937	
STUDENTID	674361	
DEGREE	MS	
DEPARTMENT	ESDC	
INCOME	56000	
DONATION	1000	

5:15:54 pm

Edit | D:\dbase4\STUDENTS | Rec 1/1 | File

For an efficient data table, make character fields no wider than necessary but give numeric fields a little room to grow.

to record the date the alumnus joined the association. Then, whenever you need to know how long a member has belonged, you can calculate the duration by subtracting Joined from the current date.

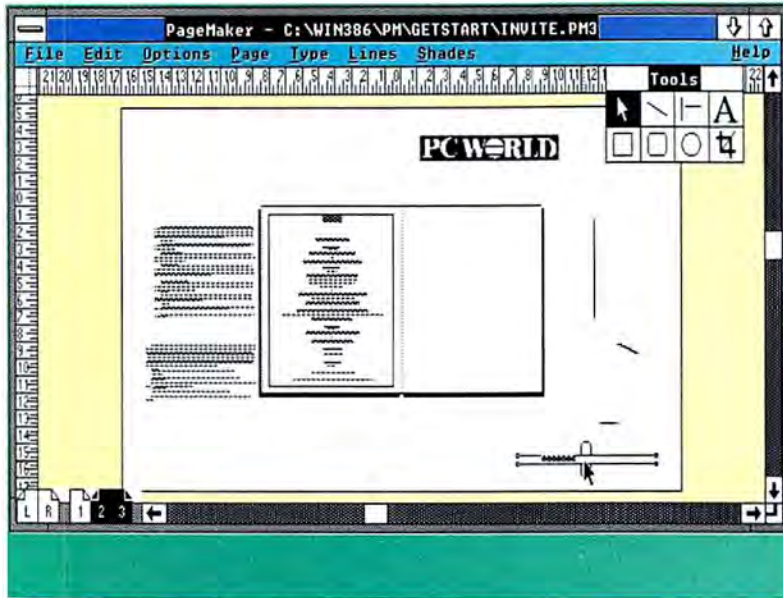
Provide for subtotals. Be sure to include a field to keep track of specific groups among the alumni, so you can separate them later. With many data base managers, including *dBASE III*, the best way to count the number of records in many subgroups is to include a numeric field with a value of 1 for every record. Totaling on this field gives the desired counts.

Since Dagnet U.'s dean will want to know the number of members and the total donations by class, state, and degree level, grouping fields for the alumni file would include Class, Degree, and State. A field called COUNT lets you count the members in each category.

Use a comments field for flexibility. The alumni data base can include many facts about the

members, including spouse's name, sport, fraternity or sorority, children, and so on. And it can be handy to identify subgroups with similar interests; aging tennis players may want to help rebuild the field house someday. The trick is to put the facts into the data base without losing track of them.

Many data base managers allow a floating search (in *dBASE*, the \$ function), which lets you search for a string of characters anywhere within a field. For the alumni data base, create a wide Comments field, enter data using a coding system (for example, "SP-Tennis" to indicate that an alumnus's sport was tennis), then use the floating search to locate all alumni with that sport. *dBASE III Plus* includes variable-length memo fields, but they can't be searched, so Comments must be a character field, which wastes disk space. By contrast, *Professional File* and several other packages let you search memo fields.



<Ctrl>-<Shift>-W displays the entire PageMaker work area.

Moving From the Simple to the Complex

If you've gotten this far, you've completed your assignment. You have set up the alumni data base, and hordes of work-study students are busy punching in data. You may have noticed that since several alumni sent in more than one gift, you've had to enter them in the data base more than once. This is a minor inconvenience for now, but perhaps you're wondering what will happen next year and the year after, as some alumni give a number of gifts. If you don't do something about it, you'll be wasting a lot of space on duplicate entries, and the burden of listing and counting the alumni will worsen.

The problem is that the data base is really storing data about two distinct entities, alumni and their donations, and there is a one-to-many relationship between them. In a future article,

we'll extend the single-file alumni association model to a true multititable relational design.
—Richard Scoville



Desktop Publishing

PageMaker Speedup Tips

A few timesaving techniques let you experience that rare PageMaker quality—velocity.

What you need: PageMaker 3.0

Although *PageMaker's* thorough printed tutorial gives novices a good leg up, regular users may soon lose patience with the program's mouse-dependent,

multimenu operations. Coaxing proofs, much less finished publications, out of a laser printer can be equally taxing.

But *PageMaker* has some underemphasized, and even undocumented, shortcuts that can help. This collection of keyboard, mouse, and LaserJet printer tips shows you how to use *PageMaker* more quickly and efficiently. All the techniques work with version 3.0, and a few, as noted, will work with 1.0 and 1.0a.

Keys to Success

The most obvious way to accelerate a *PageMaker* session is to bypass the program's many-layered menus with keyboard shortcuts. As with any *Windows* program, you can drop down *PageMaker's* main menus by holding <Alt> and typing the underscored letter of the menu heading. To execute a menu option, just type the underscored letter. But there are lots more speed tricks, and they work with any version of *PageMaker*.

Select Tools With Function Keys

When you're sculpting a page to match your visions, you want the proper tools instantly at hand. Instead of dragging the mouse pointer away from the page to *PageMaker's* Toolbox, simply select the tool by pressing <Shift> and the appropriate function key (see **FIGURE 1**). Once you memorize the function key assignments, you can remove the Toolbox and free up valuable screen space.

Change Views From the Keyboard

PageMaker's menus list numerous mnemonic <Ctrl>-key shortcuts that can shoot you to a specific command or dialog box,

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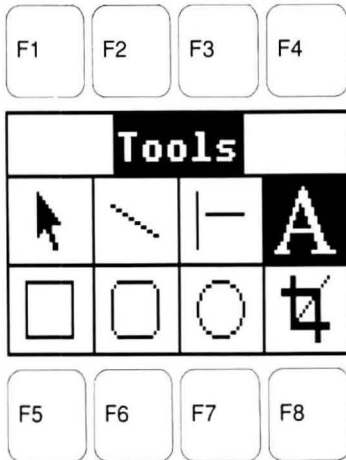


FIGURE 1: Toolbox function-key assignments

skipping intervening menu steps. For example, instead of plodding through the Page menu to change views, <Ctrl>-5, -7, -1, and -2 instantly switch to 50, 75, 100, and 200 percent views, respectively. An undocumented 3.0 shortcut, <Ctrl>-4, even offers 400 percent magnification—perfect for kerning and precise graphics placement. This is one feature that you can't access with a mouse.

Display the Entire Pasteboard The <Ctrl>-W shortcut (Fit in Window view) quickly displays an entire page on the screen—but stray text or graphics on *PageMaker's* pasteboard could still be lurking off screen. To get the ultimate aerial view of the pasteboard, type <Ctrl>-<Shift>-W. Because pasteboard leftovers are saved with a document, you can free up valuable disk space by purging such clutter regularly.

Clever Mousework

Liberating your mouse from tedious menu work doesn't mean the rodent can retire. Some of *PageMaker's* most powerful shortcuts are just a click away.

The following mouse tricks work with any version of the program.

Use the Second Button Need to zoom in and out like Spielberg? Click the second mouse button, and *PageMaker* toggles between Actual Size (100 percent) and Fit in Window views. To jump between Actual Size and 200 percent views, hold down <Shift> and click the second mouse button.

Point First, Then Zoom It's easy to lose your place when leaping from one view to another. To keep the same portion of a page in sight, place the pointer on the desired spot, and then select the view from the Page menu or by clicking the second mouse button. This trick works whether you're zooming in or out of a page, but if you get lost, select the Fit in Window view, reposition the mouse pointer, and start over.

Printing Apace

Even if you have a jumbo high-resolution screen, the best way to check your design is to print it out. Unfortunately, printing is *PageMaker's* single most time-consuming function. Luckily, there are ways to cut printing time, especially when proofing. The following tips all work on LaserJet and compatible printers.

Select Draft Resolution *PageMaker's* Macintosh version has a Proof Print feature that speeds printing by suppressing graphic images. Although all versions of *PageMaker* for the PC lack this text-proofing godsend, you can reduce print time dramatically by reducing graphics resolution.

Before clicking the OK button in the Print dialog box, click the Setup button. In the resulting dialog box, set graphics resolution to the lowest setting—75 dots per inch. Depending on the mixture of text and graphics, documents can roll out of the printer in a third of the time. Until you print your final master copy, keep 75 dpi as the default option.

Use Fast Rules *PageMaker* is an ace at generating and manipulating boxes, column rules, and other line art, but printing out a graphics-laden masterpiece can take hours. If you're in a rush (and you have *PageMaker 3.0*), select the Fast Rules option in the Print dialog box, and the document will print out in record time. Note: Don't use Fast Rules for final copy if line art is stacked or masked by other elements on the page—everything will show through when printed.

Download Fonts Once The LaserJet's cartridge and internal fonts are easy to use but limited to a few typefaces and sizes. Most *PageMaker* users seeking typographic flair soon turn to the wide array of attractive downloadable, or "soft," fonts sold on disk by HP, Bitstream, and other companies.

Before *PageMaker* prints a document that uses soft fonts, it naturally downloads the necessary fonts to the laser printer. Unfortunately, if you print the same document again during the session, *PageMaker* flushes the fonts out of the printer's memory and downloads them all over again.

Luckily, there is a way to download fonts just once. First, jot down the name and point size of the most frequently used

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```

1 include xtpause
2 include xtchrdef
3
4 real rate, cost, surcharge, chan1
5 string info, month, day, year, xtime, xrate, xcost, usedtime, primetime
6
7 primetime = "no"
8 if speed < 1200 then rate = 6 else rate = 12.5
9 if curhour >= 8 and curhour < 18 then primetime = "yes"
10 if weekday = 0 or weekday = 6 then primetime = "no"
11 if netid = "cis02" and primetime = "yes" then surcharge = 12 else surcharge = 2
12 if netid = "202202" and primetime = "yes" then surcharge = 12 else surcharge = 2
13 if netid = "CIS" or netid = "" then surcharge = .30
14 rate = rate + surcharge
15 cost = (rate * ontime)/36000
16
17 usedtime = hms(ontime,0)
18 month = str(curmonth)
19 day = str(curday)
20 year = str(curyear)
21 xtime = str(usedtime)
22 xrate = str(money(rate))
23 xcost = str(money(cost))
24
25 reply "Off"
26 while online
27   watch for
28     "please log in" : wait 5 ticks : bye
29     "a" : wait 5 ticks : bye
30     "Host Name:" : wait 5 ticks : bye
31   endwatch
32 wend
33
34 pause "Cost of CompuServe time for this session", sp + xtime + sp + ...
35 "hours at" + sp + money(rate) + sp + "equals" + sp + money(cost) + cr + lf + ...
36 sp + "... Adding cost to file CISCOST.LOG" + cr + lf, "Press <Enter> to continue ..."
37
38 info = month + "/" + day + "/" + year + ":" + sp + xtime ...
39 + sp + "hours at" + sp + xrate + sp + "x" + sp + xcost
40
41 chan1 = freefile
42 open append "c:\xtalk\ciscost.log" as #chan1
43 write line #chan1, info
44 close #chan1
45
46 end

```

LISTING 1: OFFCOSTS.XTS. A Crosstalk MK.4 CASL script that calculates your on-line CompuServe costs.

typefaces in your document. Next, select Printer setup in the File menu, and click the Setup button. Select the Fonts button, and when the Soft Font Installer dialog box appears, pick the fonts you need from the list in the left window. Select the Permanent option, and a window appears reminding you that the font will become printer resident. Click OK, exit the Soft Font Installer, and then choose the downloading preference. You can direct *PageMaker* to download the fonts automatically just for that print session, or alter the system's AUTOEXEC.BAT

file so the fonts are installed whenever the PC boots up.

To make a "permanent" soft font temporary at the end of a session, return to the font list, highlight the font, and select Temporary.

Using these shortcuts speeds and simplifies common *PageMaker* operations considerably. For a summary of *PageMaker* keyboard and mouse tips, consult the "PageMaker Quick Reference Guide" at the back of your *PageMaker* reference manual. —*Matt Lake*



Communications

Track CompuServe Charges With Crosstalk MK.4

Use Crosstalk Mk.4's CASL script language to keep track of CompuServe costs.

What you need: Crosstalk Mk.4, a CompuServe subscription, and a modem

When Digital Communications Associates (DCA) introduced *Crosstalk Mk.4*, it replaced the script capability *Crosstalk XVI* users had known with a full-blown communications programming language called CASL. (Pronounced "castle," it stands for Crosstalk Application Script Language.) CASL is arguably the most sophisticated script language on the market.

CASL's structure and command set strongly resemble BASIC, with some touches of Pascal. Many CASL statements, such as GOTO, JUMP, GOSUB, and IF...THEN, will be familiar enough, but there are many new commands peculiar to communications, such as RECEIVE and UPLOAD. *Crosstalk XVI* script writers will recognize much of the new language, but nearly half the original commands have been altered, renamed, or dis-



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carded. Fortunately, *Mk.4* includes a conversion script that translates *XVI* scripts to CASL. Though far from perfect, that script gives a head start to *XVI* users who make the move to *Mk.4*.

This article examines a script called OFFCOST.XTS (see LISTING 1). It logs you off a CompuServe session, calculates and displays the approximate connect charge, and stores the figure in a text file called CISCOST.LOG. The script is available on CompuServe's Crosstalk Forum, along with other CASL scripts and programming advice from DCA and other users. Type **go xtalk** and download the file from library 4.

If you type in LISTING 1, leave the line numbers off—they are for legibility only. The CASL script assumes that *Mk.4*, OFFCOST.XTS, and all included scripts are located in the XTALK directory on the C: drive. To run the script, simply type **do offcost** on the *Mk.4* command line, or assign the command to a function key.

The Fine Art of Stealing

Stealing is a time-honored programming technique, and CASL is an able partner in crime. OFFCOST's thieving ways become apparent in lines 1 and 2, which use the INCLUDE command to snatch two scripts supplied with *Mk.4*. The scripts contain procedures and variables that are used later in OFFCOST. Including other scripts not only minimizes typing but keeps programs short and compact.

In *Mk.4* each procedure performs a specific instruction. The procedure can include its own variables and accept arguments

that fill out the instruction. Procedures don't have to be in separate scripts, but keeping a collection of scripts that each contain a single procedure is a handy way to recycle code.

The first included script, XTPAUSE, contains a procedure that is used to display the session's cost in a window. The procedure (PAUSE) is not called until line 34. If you want to jazz up the window, you can modify the routine by adding CASL windowing commands that hide, move, and zoom windows and paint them in various colors.

The second pilfered script, XTCHRDEF, cuts down on coding drudgery. It defines abbreviated variables for the commands that format the window data in lines 34 through 39. For example, LF stands for linefeed, CR for carriage return, and SP for space.

Calculating Costs

After including the scripts, OFFCOST declares the numeric (line 4) and string (line 5) variables used to calculate and display the cost of the session. The variables' values are set in lines 7 through 23. Line 8, for example, calculates the billing rate based on transmission speed. Lines 9 and 10 determine whether you'll be charged prime/daytime rates or evening/weekend rates. Lines 11 through 13 add phone network surcharges. (If you don't have a CIS network surcharge, change .30 to 0.) Line 14 adds the rate and surcharge, and line 15 multiplies the resulting rate by the session length.

OFFCOST also relies on several of CASL's built-in variables. For example, in line 8, OFFCOST uses *Mk.4*'s ready-rolled SPEED function to determine the transmission speed. In line

17 the ONTIME variable keeps track of a session's length.

CASL also comes with functions that streamline coding. OFFCOST uses the MONEY function in lines 22 and 23 to insert dollar signs and decimal points. In lines 18 through 23, the STR function converts the numbers to text strings.

Now that the session cost has been calculated, it's time for action. Lines 25 through 32 log you off CompuServe. The WATCH FOR statement in line 27 waits for any of three prompts (Tymnet, Telenet, or CIS) that may signal a log-off, and then issues the BYE command. WATCH FOR is a major improvement over *Crosstalk XVI*'s WAIT FOR, which looks for only one condition at a time. Among other benefits, WATCH FOR's ability to respond to several possible prompts allows it to react to glitches; for example, if line noise garbles a password the first time, WATCH FOR will respond if the password is requested again.

Once the connection is broken, OFFCOST finally calls on the two included scripts. Using the PAUSE procedure in XTPAUSE, OFFCOST opens a window in lines 34 through 39 and displays the variable contents along with some other text. Here's where XTCHRDEF's variable abbreviations pay off.

Lines 38 and 39 combine the numbers stored in the variables into a single variable (INFO) that can be easily saved to an ASCII file. Lines 42 to 44 open CISCOST.LOG, append the data from INFO, and save the file. Because *Mk.4* can read and write to several files at the same time, the FREEFILE variable in line 41 makes sure that data isn't

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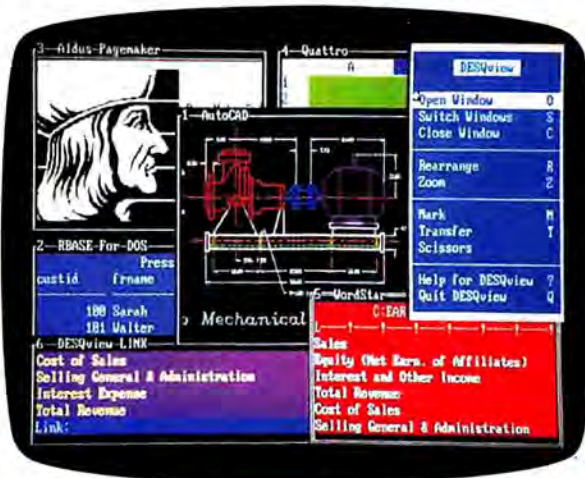
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written to another open file.

This article offers just a glimpse of the full power of CASL. You could modify OFF-COST.XTS to account for the lower rates charged on holidays, the additional surcharges tacked on by special services, and the free time you receive while uploading files. The more you explore CASL, the more elaborate—and useful—your scripts will become. —Ron White

Richard Scoville is a contributing editor for PC World. Matt Lake is PC World's Andrew Fluegelman editorial intern. Ron White is a news editor for the San Antonio Light and founder of the IBM Compatible Users Group.

USER GROUP TIPS

Helpful hints from members of the nation's user groups

Scrolling Page-by-Page in DOS

When you read a long ASCII file (such as a READ.ME file) by using the TYPE command at the DOS prompt, you can press <Ctrl>-S to start and stop document scrolling. But there's a better way—a batch file that uses DOS's MORE command to pause scrolling after each screen and then lets you resume scrolling by pressing any key.

First check to see whether your version of DOS has MORE.COM. A copy of MORE.COM must be in the default drive or, preferably, in a directory in the

system's path. If so, enter **COPY CON READ.BAT** at the DOS prompt, and then type

ECHO OFF <Enter>

MORE < %1 <Enter>

Press <F6> and <Enter> to copy READ.BAT into the current directory. Then move READ.BAT to a directory (for example, \BATCH) that is listed in the system's path. Now, whenever you want to read an ASCII file, simply type READ and then the file name, for example, **READ\CONFIG.SYS**.

*Scott A. Whitney
Orange Coast PCUG*

Run WordPerfect in RAM

WordPerfect uses temporary files to store part of your document if it doesn't fit in available RAM and also for functions such as checking spelling. You can speed up the program by putting such temporary files on a RAM drive. To do this, add the /D switch to the DOS command line when you load the program. For example, if drive E: is your RAM drive, enter **WP/D-E:**. Remember, when working with a RAM disk, you should save your file frequently to a hard disk or a floppy.

You can also load the entire program into RAM if your PC has at least 384K of RAM available. Load the entire program by issuing **WP/R**, or combine both these speedup tips by using **WP/D-E:/R**.

*Bill Weil, Vendor Coordinator
San Francisco PC Users Group*

ASCII to WordPerfect Made Easy

Reading ASCII files with *WordPerfect 5.0* produces unwanted hyphens and ill-placed line breaks when lines in the ASCII file don't fit between *WordPer-*

fect's margins. Here's a *WordPerfect* macro that creates a template with wide margins and turns off hyphenation to produce uncluttered ASCII files.

Press <Ctrl>-<F10> to start recording the macro, name it, then press <F7>NN to clear the screen without exiting *WordPerfect*. Next press <Shift>-<F8>LJN to display the Print Format menu and turn off right justification. Press <Enter> twice to exit the menu, then <Shift>-<F8>LM0<Enter>0<Enter> to display the Line Format menu and set wide margins. Press <Enter> twice to return to the document.

Next, press <Shift>-<F8>LYN to switch off hyphenation, and press <Enter> twice to get back to the document. Press <Ctrl>-<F5>I3 to display the Document Conversion menu, type in the ASCII file name, and press <Enter>.

Finally, press <F1><Ctrl>-<F10> to exit the Document Conversion menu and finish recording the macro.

After using the macro and editing your document, you can restore normal margin and hyphenation settings by pressing <Home><Home><Cursor Up><Home><Cursor Left> and then pressing <Backspace> twice to delete the template format codes.

*Debee Norling
San Francisco PC Users
Group*

Chip in! If you're a member of a user group and have tips to share, send them to PC World. We pay \$25 for each published tip. Or if you have a business problem that requires a PC solution, get in touch with our experts. See How to Contact PC World, page 4. ●

From creation

To completion...

PVI PURCHASE ORDER

VENDOR # 107 DATE 11-10-8x ORDER # 101 T TAXABLE NONTAXABLE PLEASE SEE COMPLETE TERMS OF PURCHASE AGREEMENT ON BACK

Vendor: Best Furnishings, 123 Northern Blvd., North Hills, CA 90001

Ship to: Pacific Vacations, Inc., South Beach Branch, 101 Cove Road, South Beach, CA 90060, Attn: Andrew (x3337)

PAYMENT TERMS Net 30 REQUIRED BY ASAP FOB North Hills, CA PARTIAL SHIPMENT ALLOWED NOT ALLOWED

Item	Qty	Description	Price	Amount
1	1	Conference table, model F-17	1500.00	1500.00
2	8	Chairs, model CC-55	200.00	1600.00
3	1	4' by 6' blackboard	700.00	700.00

Total Purchase Amount 3800.00

Special Instructions or Remarks: Bill To address same as Ship To address. Note: Please be careful with color match of chairs. Above quoted prices were confirmed on Oct 1st by Joan and sales manager. Deliver to 3rd floor after checking in with shipping/receiving dept. Call Andrew before delivery.

AUTHORIZED BY: [Signature] DATE: 11/10/88

Annotations:
- Easily mix multiple type styles and sizes.
- Versatile line spacing (6, 8 or 12 lpi, or any odd spacing you wish to preset).
- Wide or narrow lines, check boxes and other symbols.
- Lookup tables automatically enter data so you don't have to.
- Read existing dBASE files directly, or create new ones with up to 255 data fields per form.
- Descriptions up to 4,000 characters can be stored as data fields.

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Completion.

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Forms shown were printed using version 2.5 on an HP LaserJet II with downloaded fonts. Digitized logo printed within FormWorx by invoking a printer macro. Some features shown not available on all printers. **45-day money back guarantee on direct purchases.** When ordering by mail, include \$6.75 for shipping in U.S. and Canada. Air mail overseas—\$18. In Massachusetts add 5% sales tax. Purchase orders accepted from government agencies, institutions, and rated corporations. FormWorx with Fill & File is a trademark of FormWorx Corporation. dBASE is a registered trademark of Ashton-Tate.

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CONSUMER WATCH

Advice and information for the computer consumer

Are you shopping for a computer or peripheral? Watch out—some manufacturers use phony FCC ID numbers and ship unshielded hardware.

Anita
Amirrezvani

It's a beautiful spring day, and you're sitting near an open window, working on your new computer. The radio on your desk is playing classical music—but the reception is unusually poor. A taxicab pulls up right in front of the window; you hear the cabbie communicating with the dispatcher. Suddenly, with no warning, your computer reboots.

What's the connection between these incidents? According to experts at the Federal Communications Commission (FCC), improperly shielded PCs can interfere with other electronic devices like radios or TVs and can be affected themselves by transmissions from taxis, police, and emergency services.

By law, every PC must be shielded to limit its radio frequency (RF) emissions. The FCC, which describes its mission as "protecting the electromagnetic spectrum," requires manufacturers to build computers to one of two specifications: Class A or Class B.

Class A regulations affect computers intended for commercial or industrial use only. Class B shielding requirements are much more stringent because they cover PCs that may also be used at home, where they could interfere with radio or television reception. According to the FCC, Class B radiation limits for computers "are designed to protect a TV receiver located 10 meters away with at least one wall between the [computing] device and the receiver."

ANTHONY RIZZO

J. Jerry Freeman, FCC coordinator for computer marketing enforcement in Norfolk, Virginia, says that all computers sold through the mail or through consumer retail outlets should be certified Class B. "I have yet to see an 8088 or an 80286 that someone could reasonably argue should only get Class A," says Freeman. "A machine like a tower 386, which is really intended only for business use, might qualify as just a Class A device."

Nevertheless, Freeman estimates that Class B regulations have only a two-thirds compliance rate. Every machine that passes Class B standards must be plainly labeled as a Class B device and display an FCC ID number, but Freeman says some manufacturers, "mostly off-shore," just make up phony ID numbers. Some computers are brazenly sold without any ID number at all, probably in the hope that the consumer won't know to look for it.

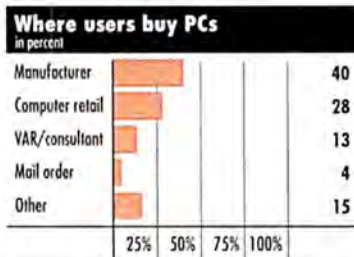
Even major manufacturers have sometimes illegally sold PCs while FCC certification is in process. "Until a unit is certified, it may be displayed at trade shows such as COMDEX, but no orders may be taken," says Freeman. That's because FCC tests may require changes to the manufacturer's existing design. To ensure compliance, the FCC hires undercover investigators
(continues)

RATE YOUR SATISFACTION: Buying PCs

How you buy depends on who you are. In this International Data Corporation survey of large organizations, 40 percent say they buy PCs directly from the manufacturer. And it's no wonder—for big accounts, manufacturers offer magnanimous discounts and service with a smile.

Survey participants say they're fairly well satisfied with buying computers from manufacturers' direct sales forces, but consultants rate even higher.

When asked what factors they consider before buying a PC, surveyed companies put quality and price at the top of their list. But other issues, such as dealer recommendation and support, also made a strong showing.



Source: International Data Corporation. From a survey conducted in June 1988 of 191 sites, each with at least 50 PCs.

who try to order uncertified units at shows like COMDEX. If they're successful, the manufacturer may be subject to a \$2000 fine.

Given the penalties, why do manufacturers fail to comply? For a simple reason: Getting Class B certification requires extra time and money. The PC has to be carefully designed from the ground up to prevent emissions. Then the manufacturer usually pays an independent testing lab to find out whether the computer meets the requirements. If it doesn't, it has to be redesigned and retested.

When the PC passes the lab tests, both the computer and the lab report must be submitted to the FCC, which performs its own tests. If the PC surmounts this hurdle, it's granted Class B certification, and the FCC requires the manufacturer to freeze the design. All peripherals—keyboards, printers, modems, accelerator boards—must be tested and certified as well. If the peripheral is sold separately from the computer, it must have its own FCC ID number.

According to experts, the faster the microprocessor, the more difficult it is to shield the computer. "When you speed up the PC's clock, the wavelengths of the frequency become shorter and shorter," says Chuck Kendall, director of labs for CK Consultants, a testing lab in Mariposa, California. "Those smaller wavelengths can creep out more easily, especially in AT-type boxes that were designed for a much slower microprocessor."

Because of their speed, it's particularly difficult for 80386s to pass, and not all manufacturers have the technical know-how to shield them properly. "Some

people just piece computers together like erector sets," says Kendall. "It's hard on the consumer because all the boxes look alike."

Fortunately, there *are* ways to make sure a computer has been certified Class B. If there's no FCC ID number on a computer or separate peripheral that's being sold to both business and home markets, you should be suspicious. If there *is* a number but you don't feel particularly confident about the manufacturer, you can call one of the 36 FCC offices and ask someone there to verify that the ID number is valid.

The FCC also offers a bulletin board called PAL that allows consumers to check FCC ID numbers. Just dial 301/725-1072 with your modem, and type in the number. The system will let you know if and when the computer actually got the FCC stamp of approval.

If you accidentally end up with a Class A machine, it's not necessarily a tragedy. But be forewarned that correcting any interference problems will be up to you.

SHOP TALK

Say Goodbye to Your Data

I have been an owner and avid user of *Dollars and Sense* since 1985. I rely on it for all my personal bookkeeping, tax planning, and portfolio management.

I was terribly disappointed when I determined that version 3.0 has a fatal glitch. What happened was I couldn't get the Forecast module to work properly, the part of the program that *(continues)*

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computes and projects tax liability. I called Monogram's technical support department and was told that entering the Forecast module had "irretrievably corrupted" my data. Because I had attempted the same procedure on my backup file, it too was corrupted. Nonetheless, Monogram's "upper management" had decided not to notify its customers.

I was incensed. I've had to spend literally weeks reconstructing and reentering the data for 1988.

*Laurence J. Kline
Chicago, Illinois*

Monogram Computing responds: I am new to Monogram, having joined as its CEO in September 1988. I was disturbed to

hear of Mr. Kline's difficulty. Since learning about that problem I have ascertained that it occurs only under these circumstances: when using MS-DOS 3.0 or 3.1, the Extend Year function, and the Forecast module.

Our software engineers have worked diligently on this problem ever since users reported it in January 1988, and we had planned to notify our customers through our newsletter. Due to personnel changes in our marketing department, however, the newsletter was not published.

As soon as a solution to the problem is available, it will be provided without charge to all registered users who request it. The problem and the offer will also be described in our next newsletter.

*David A. Brewer
Chief Executive Officer*

Editor's note: Clearly, this is a situation where users should have been notified immediately. Since they weren't, the least the company could do would be to provide the fix free of charge to all registered users, whether or not they request it.

Paying for a Monitor Twice

My Princeton HX-12 monitor has failed four times in three-and-a-half years. The symptoms are a squealing noise followed by a black, inactive screen.

The first failure happened 13 months after purchase, just 1 month beyond the one-year warranty, so I had the monitor repaired by Sorbus. The second failure occurred 12 months later; repairs were performed by a small local shop. The third failure came only 5 months later. I
(continues)

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w/32MB (40ms) Hard Drive	\$979	\$1149	\$1378	\$1478

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CPU	8088-1	80286	80286	80386	80386
Speed (MHz)	10/4.77	10/6	12/6	16/8	20/8
BIOS	Phoenix	Phoenix	Phoenix	Phoenix	Phoenix
Norton SI Rating v 4.0	2.1	11.2	13.7	17.6	22.0
Wait State	0	0	0	0	0
Standard Memory	640K	512K	512K	1MB	1MB
Shadow BIOS	—	—	—	384K	384K
Memory Upgrades	—	640K/1MB	1MB	2/4/8/10/16MB	2/4/8/10/16MB
Coprocessor Support	8087	80287	80287	80287 or 80387	80287 or 80387
Expansion Slots: 32-bit	—	—	—	1	1
Expansion Slots: 16-bit	—	6	6	4	4
Expansion Slots: 8-bit	8	2	2	3	3
Dual HD/FD Controller	w/H.D. systems	Yes	Yes	Yes	Yes
Device Bays (Exposed/Internal)	2 Exp./2 Int.	3 Exp./2 Int.	3 Exp./2 Int.	3 Exp./2 Int.	3 Exp./2 Int.
Serial Ports	1	1	1	1	2
Additional I/O Ports	All come with 1 Parallel and 1 Game Port				
Power Supply	150W	200W	200W	200W	200W
Keyboard	101 Key	101 Key	101 Key	101 Key	101 Key
Additional Features	All come with Clock Calendar w/Battery Backup and Setup/Utilities Disk				
OPTIONS:	XT10	286/10	286/12	386/16	386/20D
3.5" Floppy Drive	Optional	Optional	Optional	Your choice	Your choice

Swan/MS-DOS & GW BASIC 3.3 add \$89

Swan 386/20D**\$2199** Monitor not includedBase System with 5.25" 1.2MB Drive or 3.5" 1.44MB Drive
Assembled & Tested IBM® AT Compatible MS-DOS®, OS/2® & UNIX® Compatible

386/20D	VIDEO OPTIONS <small>Include Monitor & Video Adapter</small>			
	Drive Options	Mono	14" Flat Mono	VGA Mono
w/40MB (40ms) Hard Drive	\$2749	\$2798	\$2948	\$3248
w/80MB (28ms) Hard Drive	\$3049	\$3098	\$3248	\$3548
w/150MB (17ms) ESDI w/1:1 Interface	\$3794	\$3843	\$3993	\$4293

Tower Case Option for 386/20D w/230W power supply add \$300

To order: No surcharge on MasterCard, Visa or AMEX ■ Your credit card is not charged until your order is shipped ■ COD orders accepted with no COD fee ■ We insure your order at no extra cost to you ■ Shipping: 3% or \$5 minimum for UPS Ground. Call for shipping charges on Express Air, APO, FPO, AK, HI and foreign orders ■ Mail Orders: We accept money orders, certified checks, and personal checks. Allow 2 weeks for personal and company checks to clear ■ Defective items replaced or repaired at our discretion ■ PA deliveries add 6% sales tax ■ Prices and terms subject to change without notice ■ We accept purchase orders from qualified Educational and Corporate institutions

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TUSSEY COMPUTER PRODUCTS



Circle 207 on reader service card

called Princeton's service center to discuss this recurring problem. Princeton repaired the monitor, but it failed again 14 months later.

My repair bills are now approaching the purchase price, which means I've paid for my monitor twice. The frequency of failure is even more alarming considering that I only use the monitor at home about 10 hours per month. This works out roughly to a 100-hour mean time between failures.

*Mark Cybulski
Northbrook, Illinois*

Princeton Graphic Systems responds: We were surprised to hear Mr. Cybulski's HX-12 has been so unreliable and has become such a poor investment, es-

pecially since this color monitor's failure statistics have been low compared to our competitors'.

To resolve the dilemma, Princeton is providing Mr. Cybulski with a new HX-12E color monitor. This unit is very similar to the HX-12; it allows you to use the IBM CGA to view up to 16 colors. For better color and resolution, you can add an IBM EGA to display up to 64 colors. The unit automatically adjusts itself to the card you're using.

*Nancy L. Brenfleck
Marketing and Sales
Administrator*

Upgrade of the Month

Peter Norton Computing's upgrade policy is unfair, inconvenient, and overpriced. In August I mailed in my two master disks of *The Norton Utilities* with a check for \$25. The company

ignored my instructions and mailed me the wrong-size disk. In September I finally received the correct disk. Only one month later, Peter Norton announced a new version. I called customer service and was informed that an upgrade would cost \$44. They refused to offer a credit of any kind. What is this, an upgrade-of-the-month club?

*Kurt Sletterdahl
Edina, Minnesota*

Peter Norton Computing

responds: In June, Norton Computing quickly responded to IBM's announcement of the imminent release of DOS 4.0. To support our customers who decided to upgrade to DOS 4.0, we developed a compatible "maintenance release" of *The Norton* (continues)

... And has RamFont?

A. The Hercules Graphics Card Plus and a monochrome monitor!

They deliver high-performance video for a lot less than you'd have to pay to get color. Crisp monochrome text is easy to read, and the exclusive Hercules RamFont video mode adds a powerful new dimension to popular programs such as WordPerfect 5.0 and Lotus 1-2-3. Your favorite desktop publishing, drafting/design, and business graphics programs support the industry standard Hercules graphics mode—and they'll run faster in monochrome than in color.

Why pay for color when you print out in black-and-white?



Hercules

For more information about how you can get more out of monochrome while paying less than for color, call: 1-800-532-0600, ext. 134 (U.S.) or 1-800-323-0601, ext. 135 (Canada).

Utilities—not an upgrade. To cover our costs, we set a nominal charge of \$20 plus shipping and handling.

In October, we announced a brand new release of *The Norton Utilities* that is chock-full of new features. That's why we charge \$39 for Advanced Edition users (\$25 for Standard Edition users), plus \$5 shipping and handling.

Patti Payne
 Manager, Customer Support

When Wording Is Confusing

In August I returned a copy of *Oracle* to Oracle Corporation. I spent \$17.70 on postage to return the product, and I feel I'm entitled to a refund of that amount.

After reading *Oracle's* ad, I thought I was buying the product for \$199, period. Nothing in

the ad explains that the buyer is legally obligated to pay an additional \$1000 if the product is going to be used in any business applications. I realized that fact only after reading the license agreement that came with the package. I wonder how many readers will understand that this is the meaning of "for development only."

Rod Stewart
 Hillsdale, Missouri

Oracle Corporation responds:

Our ad coupon states that the \$199 version of *Oracle* is for development only. In other words, it is not intended for running production applications on a day-to-day basis. We have had very favorable reactions to this offer, since it allows someone to get started with *Oracle* without making a major investment.

Although we have had no other complaints like this, we are genuinely concerned that Mr. Stewart finds the wording of the ad vague. We will take his criticism into account in developing future ads. We have also made arrangements to refund Mr. Stewart's shipping charges.

Bruce Mitchell
 Vice President,
 PC Products Division

PC Plaudits

When I purchased my computer from Whole Earth Electronics, I based my decision on two factors: your review ["XTs for Bargain Hunters," *PCW*, August 1988] and the helpfulness and candor of the salesman on the phone.

(continues)



Protects while you type!

- Remains in Place while you use your computer.
- Avoids Costly Repairs. Protects delicate electronics from dust, spills, smoke, ashes, staples.
- Soft, Flexible, retains normal keyboard feel.
- Washable, Durable High-Tech Polymer lasts years.
- Hundreds of Models. SafeSkin is available for most PCs, laptops, workstations and clone keyboards.
- Office • Home • Factory • Classroom • Laboratory

List Price \$29.95. Please call or write for free color brochure. Dealer inquiries encouraged.

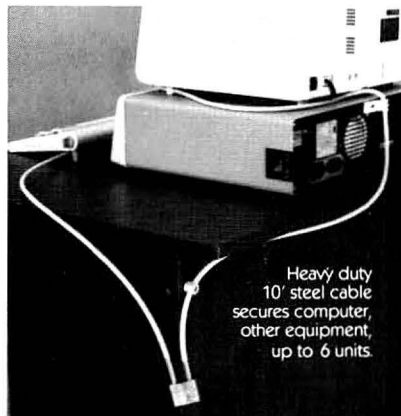
SafeSkin™
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 Dallas, Texas 75237/(214) 339-0753 • Fax (214) 339-1313
 In Canada call 1-800-663-1061

Circle 217 on reader service card

Prevent Computer Theft!

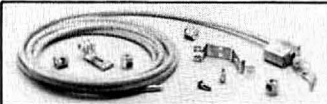
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Unique Käblit fasteners attach to equipment without drilling, using existing screws. Cable passes through fasteners preventing removal. Cable is then locked. When ordering multiples, specify locks keyed differently or alike. Installs in 10 min. Over 80 college installations.

Heavy duty 10' steel cable secures computer, other equipment, up to 6 units.


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EXCLUSIVE!
 Proprietary components prevent removal of mounting screws. (Pat. Pend.)

\$54.95 postage paid. Quantity pricing also avail. for schools, institutions, businesses, etc. Send P.O. Money back if returned in 30 days.

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 800-451-7592 413-525-7039
 Dealer Inquiries Invited



Circle 31 on reader service card

I had never dealt with a mail-order company for electronic equipment, and this experience has been wonderful. Whole Earth honored the price listed in your article and included a surge protector plus some software. The computer arrived with the hard disk formatted and with DOS already loaded. All I had to do was plug it in. I had a little trouble with the keyboard, but Whole Earth replaced it within a week of my first (and only) phone inquiry.

I was concerned about ordering by mail; after dealing with Whole Earth, I'm recommending the system to all my friends.

*Susan J. Buck
Greensboro, North Carolina*

To send correspondence or to submit material for publication in this column, please see *How To Contact PC World*, page 4. ●

POWER TIP NO. 39

WordStar Macros at Your Fingertips

To run a WordStar 5.0 macro, you usually press <Esc> and a letter key. Touch typists and keyboard jockeys who find it awkward to lift a hand from the keyboard should try pressing <Ctrl>-[and the appropriate letter key to start macros. Substituting two keys for one may sound slow, but keeping your fingers on the keyboard speeds up input.

*George Beinhorn
Nevada City, California*

BACK ISSUES



Missing something? Back issues are available for \$6 per copy (U.S. and Canada), while supplies last. Rate includes surface delivery. If you wish airmail delivery, please add \$6 per copy (U.S. and Canada). For all other countries, back issues are \$20 per copy, which includes airmail delivery. For foreign orders, prepayment is required in U.S. dollars.

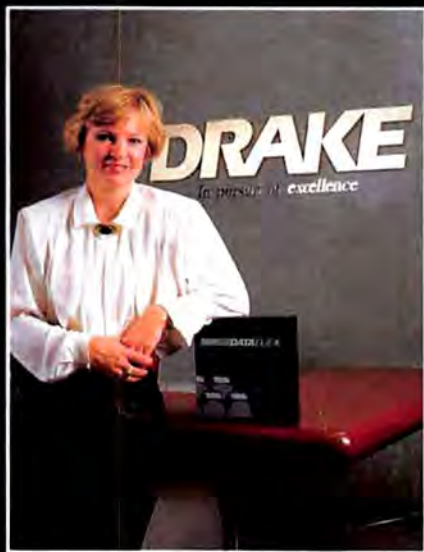
Simply enclose payment, specify the issues and quantity you desire and send to:

PC WORLD

Back Issue Department
144 Townsend Street
San Francisco, CA 94107

Sorry, phone or credit card orders cannot be accepted.

Case History #60302



"With branches in North America, England, Switzerland, Australia, New Zealand, and Hong Kong, we needed a database solution that could run on a world of different PCs, LANs and minicomputers," said Eva Nohra of Drake International, one of the world's most successful personnel service agencies. "We chose DataFlex for all our in-house programming because it gave us this needed capability while providing a standard interface that looks and performs the same on a stand alone PC as it does on a LAN or MicroVAX."

No programming changes required from system to system.

"DataFlex delivers, by far, more combinations of hardware and operating systems than any of the competition, and DataFlex source code is transportable, without

change, to every supported system. That's very important to Drake International because it gives each office the flexibility to acquire the computer hardware that is best suited to a situation without worrying about re-inventing the wheel and spending a fortune on program development. All we need to do is install the run-time module for the desired system and we're up and running immediately with proven, standardized programming."

Easy to use for even the least technical operators.

"A major component of our recruitment and placement operations involves mailing lists. DataFlex's capability to quickly generate reports utilizing a wide range of variables is extremely important," explains Nohra. "DataFlex's intuitive 'Point and Shoot' Query technique makes it easy for non-technical operators, even those lacking previous knowledge of programming or query language syntax, to be productive after only minimal training. There are a lot of products which promise the world, but for Drake, DataFlex has really delivered."

"Lots of DBMS/4GL products promise the world... DataFlex delivered it for Drake International."

Eva Nohra, Drake International, Toronto, Ontario

Toll Free Sales Lines:

Nationwide:

1-800-451-FLEX

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THE UPGRADE PATH

**Hands-on advice
for upgrading PCs,
compatibles, and
peripherals**

Storage to go, the ultimate LaserJet cartridge, and more

*Edited
by
Robert
Luhn*

Hard Disk on the Run

For most users, portable mass storage means a 1.2MB floppy disk. And for good reason. Portable hard disk drives have a reputation for being fragile, expensive, and hard to install. Why, you may ask, doesn't someone make an external drive that's as rugged as Plus Development's Hardcard but can be attached to any system for a quick storage fix?

As you might guess, someone has. The Plato Hardpac 20 from Sunrise Technology Corporation not only matches the Hardcard 20's price, storage, and access speed, but it is truly portable.

Instead of plugging this book-size drive into a slot, like the Hardcard, you connect it to a Plato controller board that you install in a PC, XT, AT, or compatible system; the company supplies a 3-foot cable, so the Hardpac 20 can purr away just about anywhere on your desktop. Better still, you don't have to install drivers, modify CONFIG.SYS files, or even run your system's Setup program. People on a tight budget who need to share hard disk storage or are interested in backing up all the office PCs cheaply can simply buy extra controllers for their machines
(continues)



Hard to install, easy to use: The Hardpac 20 must be set up on an XT, but it's perfect for quick backups and cheaply sharing hard disk storage.

Block That Static!

Before you pop the top off your PC or slide that hard disk drive out of its box, take these precautionary steps to eliminate static—and to protect your hardware investment:

- **Avoid wearing polyester clothing—**you could easily build up a charge that could destroy the chips on an expansion board. Wear rubber-soled shoes or go shoeless, and don't handle other static-generating materials, such as polystyrene or Styrofoam, before upgrading a system.

- **Leave hardware in its antistatic packaging until installation time.**

- **Minimize your chances of building up static electricity by limiting your movements. Keep needed hardware, tools, and software nearby.**

- **Just before you remove the device from its packaging, ground yourself by touching the fan grill on the back of a turned-off PC that's plugged into a grounded outlet.**

- **Touch only the nonconductive edges of any device you're handling. With most expansion boards, that means the thick green board the chips are mounted on; with disk drives, the outer metal frame. Whatever you do, don't touch the shiny metal slot connectors or cable connectors on the device. You could give the unit a very expensive jolt. —R. L.**

at \$95 a pop. Security-minded users can unplug the drive in about 5 seconds and stash it in the office safe.

Unfortunately, the Hardpac 20 isn't the easiest drive to install. Instead of typing one or two commands to configure the drive, the Hardpac 20 forces you to fuss with FDISK and FORMAT. And though the drive will run off

most systems, you must initially configure it on a true Blue IBM PC XT or risk facing a long, torturous installation session. Another pain: If you want to create a bootable Hardpac, you must first disconnect the XT's hard disk controller and then partition the Hardpac. First-time upgraders should also be wary of the user manual, which occasionally leaves out steps, contradicts itself, and includes a few deadly typographical errors.

As with all such upgrades, park the PC's hard disk if it has one, turn off the system, unplug all external cables, remove the system cover, and ground yourself before touching any component. Place the Hardpac 20 controller board on its antistatic wrapper and locate the jumpers at the 6 o'clock and 9 o'clock positions. If you're installing the board in an XT that already has a hard disk, for example, make sure the jumpers cover the two rightmost pins on each jumper block. (Ignore the accompanying illustration in the manual—it shows incorrect settings.) Pop the board into a free slot and connect the supplied cable to the board and to the back of the Hardpac 20. Reassemble the system but don't put the cover back on yet—you may have to change jumpers on the controller if it conflicts with other boards in the system.

Slip a formatted floppy system disk containing FDISK and FORMAT into drive A: and turn on the computer. The Hardpac 20 will click and whir while the XT

goes through its usual motions, stops, displays a message like 'EXTERN ROM CA00', and after 10 seconds finally boots up. (If the system freezes, turn it off and make sure the jumper settings on the board are correct.)

Here's where you must be careful, because unless you're creating a bootable Hardpac (and disabling the XT's hard disk), it's easy to format the wrong drive. Type **A:FDISK** and then log on to the Hardpac 20 by selecting option 5 (Next Hard Drive) from the opening FDISK Setup Program menu; 'Current Fixed Disk Drive: 2' should appear at the top of the screen. Now select 1 (Create DOS partition), then 1 again (Create Primary DOS Partition), and finally, answer 'Y' to the prompt asking if you want to devote the entire partition to DOS. When the job's done a few seconds later, press <Esc> and the system reboots.

Once the A > prompt reappears, type **FORMAT D:/S** to format the disk; in 4 or 5 minutes, the Hardpac 20 will be ready to hit the road. Note: Contrary to the manual's warnings, the Hardpac 20 and the computer you tie it to don't have to be using the same version of DOS. However, if the computer already has a hard disk, you can't boot it off the Hardpac 20. The drive also demands a whopping 20 watts at start-up—so those with older PCs and Compaq portables should consider getting more capable power supplies.

The take-anywhere hard disk is clearly an idea whose time has come, and the Hardpac 20 is a pretty fair implementation. Just *(continues)*



U.S. MAIL

When We Challenged Our Competitors' Customers To Try PC Tools, This Was Their Answer.

A couple of months ago we gave users of Norton™, Fastback™, Sidekick®, X-TREE™, Mace™, and Disk Optimizer® a chance to upgrade to the number one selling utility package: PC Tools™ Deluxe.

A few days after the ads ran we started getting bags of mail, week in and week out, from customers anxious to get something better than what they already owned.

But why would they opt for PC Tools Deluxe as opposed to staying with what they already had? Simple. Because it's a far better product. It includes the best of what the others offer, and a lot more.

You see, PC Tools Deluxe is the only product to give you a DOS Shell, data recovery utilities, a hard disk backup program, and a desktop manager all in one box. Which means you won't have to learn the ins and outs of a whole bunch of products.

Circle 155 on reader service card

Just one—PC Tools Deluxe.

The only one with pull-down menus, full mouse support, and a windowed environment that lets you run up to 15 of our desktop applications at once.

The only one with an operating environment so consistent throughout that once you've learned one application you'll be proficient in them all.

And the one that has received PC Magazine's Editor's Choice Award not just once, but twice.

So if you're looking to buy the best, buy PC Tools Deluxe first. You won't be disappointed.



Central Point Software INC.
A VIDEO TECHNOLOGY COMPANY (503) 690-8090.

remember that it's not for upgrade neophytes. Until the designers of the Hardpac 20 follow the Hardcard's example and make installation simple, automatic, and bulletproof, leave this upgrade to a pro. —R. L.

WHERE TO BUY

Plato Hardpac 20

Sunrise Technology Corp.
3226 Beta Ave.
Burnaby, British Columbia
V5G 4K4 Canada
800/663-2237, 604/294-1113
List price: \$695, board and cable \$95, complete package \$785

Requirements: 256K RAM, DOS 2.0 or later version

Warranty: 30-day money-back guarantee, one year parts and labor

Technical support: unlimited phone support, toll-free number, M-F 8:30-5

Other support services: none

For more information, circle 640 on reader service card.

More Fonts at Your Fingertips

If you're like most Hewlett-Packard LaserJet users, you probably find using downloadable (or "soft") fonts a hassle. Yet the LaserJet's humdrum internal Courier and Line Printer fonts don't give a document much visual punch. The quick and easy solution, of course, is to reach for an HP font cartridge. Unfortunately, HP's font cartridges cost an average of \$200 apiece, and no single cartridge holds all of a font's variations (bold, italic, portrait, landscape, and so on). Until now.

Thanks to Pacific Data Products, font-hungry LaserJet users can turn to 25 Cartridges in One!, a single cartridge that packs 103 fonts yet costs only \$399—pocket money compared to the \$5000 tab for the entire HP collection. The equivalent of just about every HP cartridge is crammed into this product, with the exception of bar code characters and some miscellaneous symbols. You can use 25 Cartridges in One! with the LaserJet Plus, 500, 500 Plus, and Series II and IID, as well as Canon's LBP-8II. Software compatibility, however, is currently limited to 1-2-3, Microsoft Word, MultiMate Advantage II, and WordPerfect 4.2 and 5.0. Pacific Data plans to supply a Windows 2.03/38b driver free to registered users in short order, followed by drivers for XyWrite, WordStar, DisplayWrite, and Samna Word V. If your program isn't supported and you're comfortable using escape sequences, however, Pacific Data's thorough, illustrated user manual supplies the necessary information.

Using 25 Cartridges in One! is a snap. To access the cartridge's portrait and landscape fonts with Word, for example, copy the supplied PAC25P.PRD and PAC-25L.PRD drivers to Word's subdirectory. Then run Word, load the document, and select either driver as you would any other by pressing <Esc>, selecting Print Options, pressing <F1>, highlighting the driver's name, and pressing <Enter>. To select the typeface and point size, highlight the characters in the document, press <Esc>, select Format Character, tab down to the Font Name option, and press <F1>. A list of available fonts cascades onto the screen. Highlight your

selection, press <Enter>, go back to the Format Character menu, select the font size, and you're ready to print.

No upgrade is completely trouble-free. The font you want may be hard to find, especially if it's one of the eight Courier fonts with the same name but different character sets. You'll find yourself flipping through the user manual's font tables frequently, but that's a small price to pay for this cornucopia. Unfortunately, 25 Cartridges in One! doesn't support WordStar—or the original LaserJet, Canon's LBP-8A1, or other LaserJet compatibles. But for the majority of LaserJet and Canon users, 25 Cartridges in One! is a simple and inexpensive tool that's a bargain by anybody's standards.

—Matt Lake

WHERE TO BUY

25 Cartridges in One!

Pacific Data Products
6404 Nancy Ridge Dr.
San Diego, CA 92121
619/552-0880

List price: \$399

Requirements: HP LaserJet (Model 500 or higher), Canon LBJII or LBJIR

Warranty: lifetime

Extended warranty: none

Technical support: unlimited, no toll-free number, M-F 7:30-5

Other support services: none

For more information, circle 641 on reader service card.

Matt Lake is PC World's Andrew Fluegelman editorial intern.

To send correspondence or to submit material for publication in this column, please see How to Contact PC World, page 4. ●

Morgan Steenman & Tuininga

Business Development &
Marketing Group

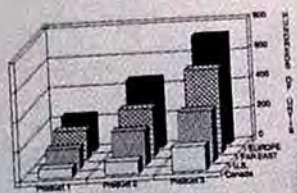
October 27, 1988

Mr. Charles Bostwick
Bostwick Parker Company
13644 148th Avenue
Detroit, Michigan 49684

Dear Mr. Bostwick:

The results of the computer simulation are in, and you'll find them quite fascinating. Here is an interesting surprise: the greatest sales potential exists with product number three. What's more, the largest sales will result from Europe and the Far East, not the United States.

Bostwick Parker Co.
New Product Sales Projections



These sales projections take into account the requested in the model. Specifically, the greatest sales projection was reduced to reflect the

Morgan Steenman & Tuininga

Business Development &
Marketing Group

October 27, 1988

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Bostwick Parker Co.
New Product Sales Projections



These sales projections take into account the requested in the model. Specifically, the greatest sales projection was reduced to reflect the

CAN YOU SPOT THE \$700 DIFFERENCE?

One of the nearly identical samples you see above was printed with the HP Laserjet Series II. The other is from the Mannesmann Tally* MT905. Both are reprinted here exactly as they came out of the printers.

But what might surprise you is the rather dramatic difference in the manufacturers' suggested retail prices.

The Mannesmann Tally laser is \$700 less. Yet it offers the same high quality output, lowers operating costs 25 percent, and prints at six pages per minute.

The MT905 comes with the same resident type fonts as HP, accepts standard HP font cartridges, and lets you choose optional memory upgrades from one to four megabytes.



MT905 Specifications

- Technology: scanning laser.
- Print Speed: 6-pages per minute.
- Resolution: 300 x 300 dpi.
- Emulations: HP Series-II. [optional emulations: Epson,* IBM* Proprinter, & Diablo 630.]
- Standard I/Os: Serial & parallel.
- Memory: 512K. [upgrades: 1, 2, & 4 megabytes.]
- Typefaces: Courier medium & bold, line printer, accepts standard HP font cartridges or any downloadable font in HP-format, 6-resident fonts + 2 font cartridge slots.
- Paper Handling: 250-sheet input & output bins. Manual feed handles single sheets, envelopes, transparencies, and labels.
- Workload: 4,000 pages-per-month.
- Suggested Retail: \$1,995.

For more convenient paper handling, the universal paper cassette holds letter, legal, and international sizes, plus up to 15 standard envelopes. You can choose face-down output to keep long documents in the right order. And the manual feed lets you print labels or transparencies.

So any way you figure, the answer still comes up the same. The Mannesmann Tally laser looks perfect. And so does the price.

For the name of your nearest dealer, call the toll-free number listed below.

**MANNESMANN
TALLY**

1-800-843-1347

Ext. 303

Epson and IBM are registered trademarks.

Circle 112 on reader service card

PC WORLD Profile

TOPS tells why PC WORLD works for them.

"PC WORLD is a critical part of our marketing mix. We put a strong advertising emphasis on PC WORLD because we're convinced that the magazine reaches an important part of our market, especially the department manager for the workgroup and the power user."

On reaching readers ready to buy.

"We're pretty hot on the book. I think the best thing I can say about our involvement with PC WORLD is that it's a magazine that reaches a marketplace which is ready and waiting to adopt a solution like TOPS."

On readers who manage the buying process.

"I think people who read PC WORLD want an information source that helps them manage the buying process. PC WORLD covers a lot of ground — making critical computing issues accessible to people who make purchase decisions that could affect their company's short-term health and long-term viability."

On reaching readers who make decisions.

"We need the people who are directly affected by and interested in solutions TOPS provides. But often they are just part of the decision-making process. We also need to reach the business buyers and PC coordinators — people who need to understand what solutions are available in the marketplace and often determine what is actually purchased. PC WORLD delivers them for us."



Rich Shapero, VP and General Manager, TOPS division, Sun Microsystems, speaks on the value of PC WORLD as an integral part of their success. The TOPS division specializes in developing and marketing networking products for IBM-PC's, Apple Macintoshes and Sun Workstations.

On TOPS and why PC WORLD is important to them.

"In the past twelve months, some amazing things have happened at TOPS. We've shipped more than 400,000 TOPS network nodes. We think we're seeing the emergence of a

new product category for the micro-computer industry—the plug-and-go LAN. My favorite statistic is that TOPS nodes now rival monthly Ethernet board volumes. We've gone to PC WORLD to continue to tell the TOPS story—the growing consumer acceptance of a network solution that makes sense. PC WORLD works for us."

Circle 900 on reader service card

PC WORLD works.



THE HELP SCREEN

PC World offers answers and advice at every level

Mate DOS 4.0 with your compatible, merge your return address in DeskMate, avoid the 1.2MB DISKCOPY shuffle, convert WordPerfect 4.2 macros to 5.0, lock intruders out of drive A:, and more.

*Karl
Koessel*

A DOS for All Systems

Q. *I have some questions about IBM's DOS 4.0. Will it work on my XT clone? If not, where can I get its MS-DOS counterpart? Will it support my old RAM expansion boards?*

*Ross R. King
Rancho Cordova, California*

A. Without knowing the specific components in your XT clone, I can't give a definitive answer. IBM DOS 4.0 does work on IBM PCs, XTs, ATs, AT 286s, PC Convertibles, and PS/2s. Presumably, it works on any compatible system, provided that the system's ROMs are not too old. Most very old clones will not boot DOS 3.2 or later versions without a ROM upgrade.

If your system's manufacturer offers DOS 4.0, you may be better off with that version than with another company's offering; your manufacturer's release would support any special features your clone might have. Call the company and ask if DOS 4.0 will run on your system and if the company sells it. For "generic" clones, manufacturers usually sell what's known as retail MS-DOS, a Microsoft product that's also available via mail order and at your local computer store. In any case, your memory boards will function as they always have—no better, no worse.

Addressing DeskMate

Q. *I have read more than once in PC World's Star-Dot-Star column about using ANSL.SYS to redefine keys. I have tried several times, without luck, to create an ANSL.SYS macro to enter my three-line name and address.*

After reading Tom Swan's note under "AutoCAD in Comfort" [Star-Dot-Star, PCW, November 1988], I concluded that Tandy's DeskMate program does not recognize ANSL.SYS key assignments. However, even at the A> prompt, I get only part of what I want, and it's all on one line. Is there a limit to the size of an ANSL.SYS macro?

"AutoCAD in Comfort" included a table of ANSL.SYS extended key codes for certain key combinations. Would you please tell me the codes for <Alt>- and <Ctrl>-lowercase letter and <Alt>- and <Ctrl>-number combinations?

*Thomas Minnich
Archer City, Texas*

A. Almost all word processors take over the keyboard and therefore do not recognize ANSL.SYS key reassignments. You need another way to automate entering your name and address into the letters you write. Such a task is usually accomplished using a word processor's macro capability, but Text, DeskMate's word processor, doesn't (continues)

do macros. To accomplish the task, make a small Text file containing your three-line address and a blank line, and save it with the single-character name **A** (*DeskMate* adds the .DOC extension). Then, whenever you need to insert your address, position the cursor, press **<F2>** (the Files key), press **M** to highlight 'Merge', press **<Enter>** to execute the function, press **A** to highlight A.DOC on the Files list in the Merge File dialog box, and press **<Enter>** to merge in your address.

Although *DeskMate* doesn't recognize ANSI.SYS reassignments, knowing how to make multiline assignments may prove fruitful with other applications. The command `PROMPT $e{0;104;"Your name";13;10;"Your address";13;10;"Your city, state, and ZIP code";13;10;10p` will assign your three-line address to **<Alt>-<F1>**. The `:13s` and `:10s` are the ASCII codes for the carriage returns and the linefeeds required to separate your address into three lines and add an extra linefeed at the end of the address.



Lockette prevents unauthorized use of your computer.

Since the DOS command line accepts only 127 characters, using a DOS command to make an ANSI.SYS reassignment limits you to 127, minus about 20 for the command itself. But you can assign a string of 192 characters, entered as ASCII codes or within double quotes, to a key: Save the ANSI.SYS reassignment escape sequence in an ASCII file—called, for example, ANSIKEY—and then issue the command `COPY ANSIKEY CON`. Because the reassignment string and the assigned key are kept in a static buffer of memory, increasing the number of assigned keys decreases the number of characters that can be assigned. Also, some public-domain versions of ANSI.SYS have larger assignment buffers than that provided by DOS's ANSI.SYS.

Your keyboard doesn't differentiate case for **<Alt>-letter** combinations; it sends the same code for **<Alt>-A** as it does for **<Alt>-a**. The same holds true for **<Ctrl>-letter** combinations. These, however, are not extended keys; their ASCII codes are 1 through 26. The keyboard does not send codes for **<Ctrl>-number** combinations. The ANSI.SYS extended key codes for **<Alt>-1** through **<Alt>-0** are 0:120 through 0:129.

ROM BIOS Drive Support

Q. I read "3½-Inch Drive in a Compaq Portable" [*The Help Screen, PCW, August 1988*] and decided to put one in my very early model Portable. Installation was fairly simple and the drive works—sort of. Although it can read disks that were formatted to 720K, it can't itself format

a floppy to 720K. I've tried the `DRIVPARM` and `DEVICE=DRIVER.SYS` commands, but nothing makes a difference. Is there something I'm missing?

Dale Paulson
Alexandria, Virginia

A. Yes, but you won't find it in the August item. In order for a system's 3½-inch drive to format 720K disks, its ROM BIOS must contain support for that type of drive. I neglected to mention in the August item that your Compaq Portable's motherboard must have revision G or later ROMs. Sorry about the inconvenience. Contact your local dealer for an upgrade.

Nine-Bit Bytes?

Q. While adding RAM to an XT motherboard, I noticed that each bank contains nine chip sockets. Since each 64-kilobit chip contributes a single bit to each byte of RAM, and each byte consists of 8 bits, 8 chips provide 64K of memory. So what's the ninth chip for?

Michael Matthews
Trumbull, Connecticut

A. The original IBM PC was designed with nine dynamic RAM (DRAM) chips per memory bank, with the ninth chip used for parity checking. Parity checking helps ensure that memory values are valid. It works by setting the parity bit of a particular byte to 0 or 1 depending on the number of 1 bits in that byte. Before a byte is used again, its parity value is checked against that byte's number of 1 bits. If the parity value is valid, processing continues; otherwise the system halts. A better design

```

ECHO OFF
CLS
DEL C:\TEMP\*.* <C:\DOS\YCR >NUL
PAUSE Insert SOURCE disk in drive A:
C:\DOS\XCOPY A:\ C:\TEMP\*.* /E/S
ECHO Remove SOURCE disk from drive A:
PAUSE and Insert a blank, formatted TARGET disk
C:\DOS\XCOPY C:\TEMP\*.* A:\ /E/S

```

LISTING 1: Hard disk-based **DATAcopy.BAT** automates duplicating data files disks, quite handy for nearly full 1.2MB media.

would let you try to correct the byte value and proceed or, at least, would continue after warning you of the error.

The PC's parity-checking memory design has been carried over to the XT, the AT, PS/2s, 80386-based computers, and most compatibles. Therefore, when adding memory to 16-bit and 32-bit systems that use DRAM chips, you have to add 18 (not 16) and 36 (not 32) chips at a time, respectively.

DISKCOPY Dilemma

Q. *I use an Everex 80386/20 as an AutoCAD workstation under DOS 4.0. It has 2MB of RAM, a single floppy drive, and an 80MB hard disk. However, when copying an almost full 1.2MB disk with the DOS command DISKCOPY, I'm prompted six times to swap between the source and target disks. Why can't a computer with 2MB of memory do a 1.2MB DISKCOPY in one pass?*

*Scott N. Smith
Edmonton, Alberta, Canada*

A. It's not the computer that can't do DISKCOPY in one pass, it's the operating system. Before expanded memory, DOS could use only 640K to hold the operating system, running program,

and the program's data. DOS 4.0 takes at least 64K, and more likely 100K, counting device drivers and other system options. DISKCOPY takes more than 10K. Subtract the 75K minimum total from 640K and you're left with 565K, less than half the RAM necessary to hold 1.2MB of data. That adds up to three pairs of disk swaps.

Conceivably, DISKCOPY could be rewritten to recognize and use expanded memory in order to reduce the number of disk swaps. OS/2, which manages 16MB of memory, could also theoretically do the job in a single pass, but only if DISKCOPY were rewritten to make use of the extra memory. Unfortunately, such consideration of user needs is missing from DOS 4.0, the first DOS version to support expanded memory, and from OS/2.

It's unlikely that you'll see a single-pass DISKCOPY offering from an independent developer of software utilities. That may be good news for your data, though, because you really should use DISKCOPY as infrequently as possible. Since DISKCOPY copies the data in each sector of the source disk to the same sector of the target disk, the program requires a defect-free target disk to ensure that data is not "copied" to a defective sector, which won't retain it. You should use DISKCOPY only to make backup

copies of your program disks.

For copying a few data files from one disk to another, use the command **XCOPY A:\ B:\ /E/S**, even though you have only one floppy drive; the system will prompt you to switch disks. The **/E** tells XCOPY to duplicate on the target disk any of the source disk's empty directories. The **/S** tells XCOPY to duplicate any of the source disk's directories containing files, complete with the files. If the source disk contains no subdirectories, you can use the simpler command **XCOPY A: B:**.

To copy nearly full 1.2MB data disks, use some of that 80MB hard disk: Issue the command **MD C:\TEMP** to create a temporary subdirectory. Insert the disk to be copied into drive A:, and enter **XCOPY A:\ C:\TEMP /E/S** to copy the floppy's files, including those in subdirectories, to the hard disk subdirectory; use **XCOPY A: C:\TEMP** if the source has no subdirectories. Then, replace the disk in drive A: with a blank, formatted 1.2MB disk and issue **XCOPY C:\TEMP A:\ /E/S**. Now that you have a backup floppy, issue **DEL C:\TEMP** to delete the files in the \TEMP directory, press **Y** to confirm, enter **CD C:** to change to the root directory of drive C:, and use **RD C:\TEMP** to remove the temporary directory.

If you make such copies often, don't remove \TEMP, just empty it. You may also want to create the batch file **DATAcopy .BAT** (see **LISTING 1**) to automate the procedure. **DATAcopy.BAT** should be kept in a directory listed in your system's **PATH** and requires that **XCOPY** is in the \DOS directory of drive C:, that you have a blank disk in the *(continues)*

same format as the source disk, and that the directory C:\TEMP exists. It also requires a file called YCR, which consists simply of a Y and a carriage return, in the \DOS directory of drive C:. To create YCR, change to the \DOS directory, type **COPY CON C:YCR**, press <Enter>, press Y, press <Enter>, press <F6>, and press <Enter>.

WordPerfect Macro Menu Update

In last month's *Letters* column, reader James P. Hall lamented the fact that the custom *WordPerfect 4.2* menus described in George Beinhorn's "Macro Menus for WordPerfect" (*PCW*, February 1988) wouldn't work with *WordPerfect 5.0*. We promised an update, and here it is.

The MACROCNV.EXE program included on *WordPerfect 5.0's* Conversion disk converts a 4.2 .MAC macro's text, cursor keystrokes, and 4.2 functions that are unchanged in 5.0 into the new version's .WPM format. Copy the macros you want to convert along with MACROCNV.EXE to the directory where *WordPerfect 5.0* resides. Then enter **MACROCNV file name**, where *file name* is the name of a 4.2 macro; you don't need to type the .MAC extension. You could include multiple file names on the command line for a mass conversion, but don't—important information would scroll off the screen after the first few files were converted.

MACROCNV.EXE appends the warning '{;} BAD! ~' after each version 5.0-incompatible command it finds, then cheerfully informs you that some manual editing is necessary. To finish off such a partially converted macro, open it in *WordPerfect 5.0's* macro editor (press <Ctrl>-<F10>), type the macro's name, then press 2 or E), locate any commands marked with the BAD! label, and replace them with the appropriate *WordPerfect 5.0* command.

Since the Merge command sequence used in George Beinhorn's pop-up menus article did not change in 5.0, MACROCNV.EXE converts the menus without a hitch. However, in each menu macro, the article omitted an important code required to execute the macros at the cursor position rather than at the end of the document: Append a ^Q (<Ctrl>-Q) after the final ^G^O combination at the end of each menu macro.

Lock a Floppy Drive

I recently learned of a new product that delivers one more way to prevent booting from drive A: (see "System Security," *The Help Screen, PCW*, February 1989). The Lockette is a lock that you affix to the front of any 5¼-inch floppy drive that uses a lever rather than a door. The device prevents insertion of a floppy disk, which might be designed to bypass system security, or removal of a nonbooting floppy disk, which generates the error message 'Non-System disk or disk error; Replace and strike

any key when ready'. Although it won't stop a hacker with a crowbar, this lock is a simple, effective deterrent to unauthorized access.

WHERE TO BUY

Lockette

Z-Lock Manufacturing Co.
1201 N. Catalina Ave.
P.O. Box 949
Redondo Beach, CA 90277
213/372-4842, FAX 213/372-1598

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For more information, circle 700 on reader service card.

System/36 Correction

While developing the solution to rebooting automatically with an alternate CONFIG.SYS (see "Irreconcilable Drivers," *The Help Screen, PCW*, December 1988), I was unaware that PC Support/36 by default installs a configuration file (for identifying virtual disks, printers, token ring network messaging facilities, and so on) called CONFIG.S36 in the root directory. Therefore, you should not use the file name CONFIG.S36 as shown in the December item; use another name, such as CONFIG36.SYS, instead. My thanks to reader Russell Zipoff for bringing this matter to my attention.

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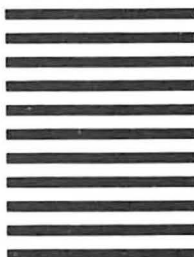
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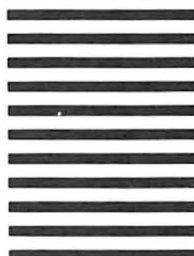
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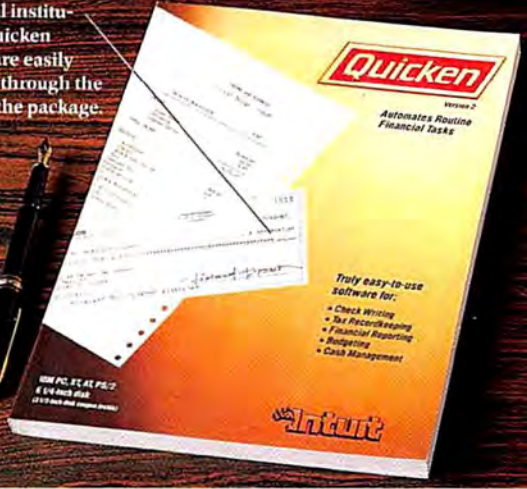
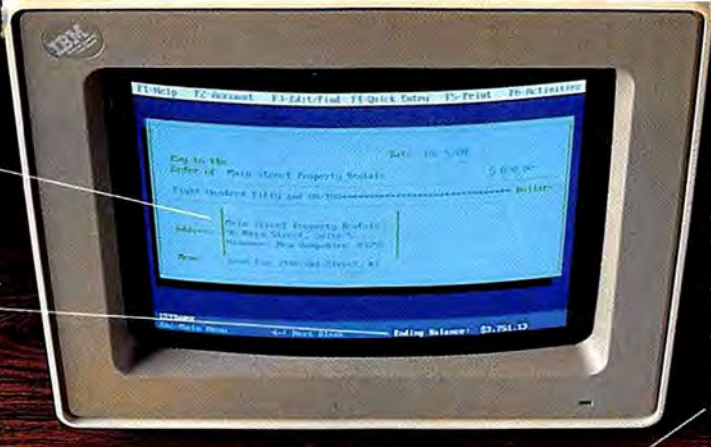
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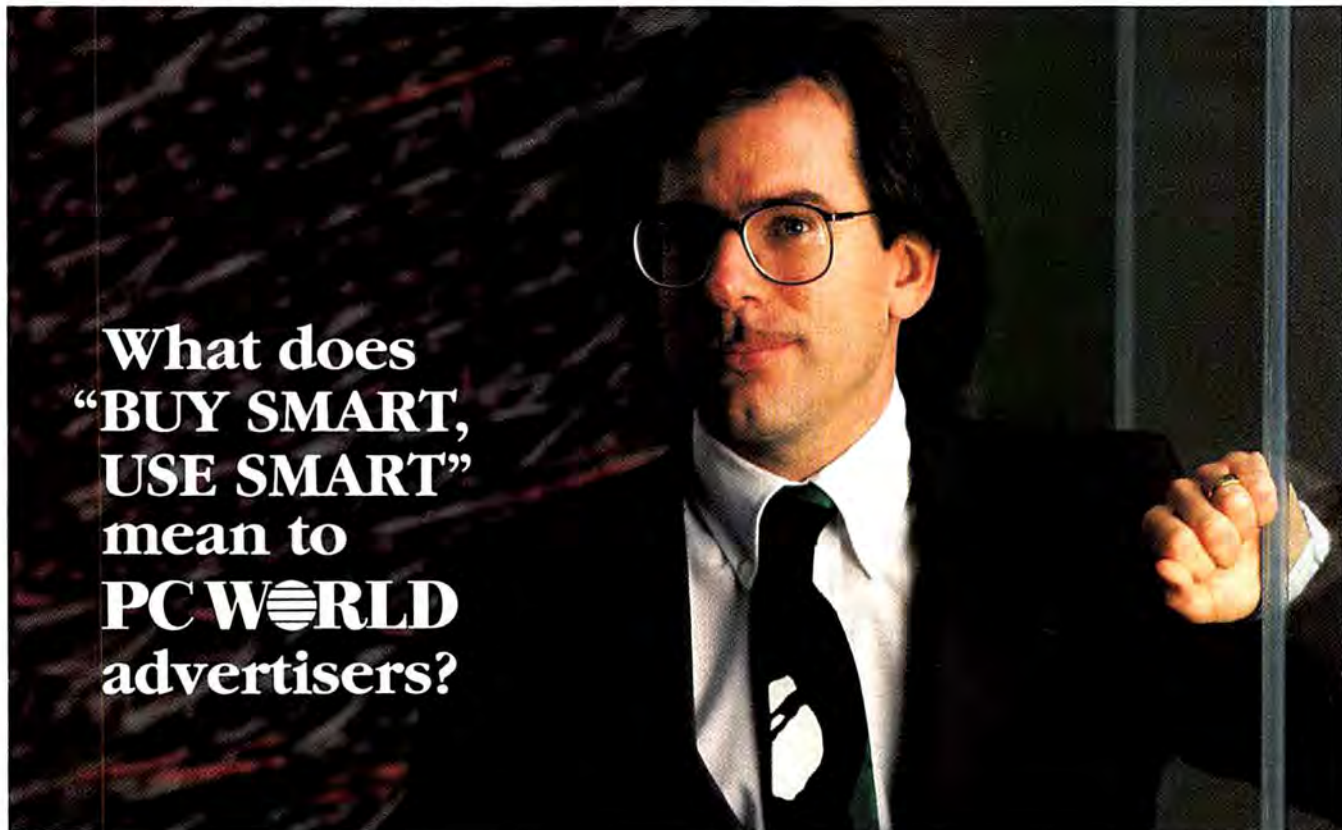
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The Right Stuffer

Are you tired of having to press <Enter> to get past opening screens that demand you 'Press <Enter> to continue'? If so, you can use my program PRESS.COM to stuff up to 15 keystrokes into your keyboard buffer, letting you write batch file commands to "press" most any key on a typical PC keyboard. For example, to move past the opening display of the Lotus 1-2-3 Access System and execute 1-2-3, use the batch file command PRESS "LOTUS" CR CR "/FR". PRESS interprets the first CR as <Enter>, which causes the text in quotes to be executed just as though you had typed LOTUS <Enter> on the command line. PRESS also interprets the second CR as <Enter>, which starts 1-2-3, and then enters the keystrokes /FR, which retrieve a file.

In addition to quoted characters and CR, PRESS.COM understands the two-letter codes that represent the various keys listed in TABLE 1. (Each code must be in uppercase.) PRESS.COM can also type control keys, indicated by a caret prefix. For example, the command PRESS ^C enters a Control C into the keyboard buffer. Other useful examples are PRESS "FOXPLUS" CR F1, which starts *FoxPlus* and jumps directly to the help screen; and PRESS "LOTUS" CR RT RT CR, which loads the Lotus 1-2-3 Access System,

presses <Cursor Right> twice, and then presses <Enter>, to select the Translate Utility.

Murray A. Kristell
Mayfield Heights, Ohio

Editor's note: To create your own copy of PRESS.COM, first bring up BASIC, then load XMAKER2.BAS (LISTING 1), use the MERGE command to append the DATA lines shown in PRESS.DAT (LISTING 2), and run the resultant program.

Cheap LetterJet Refills

Soon after buying an Epson HS 80P-U LetterJet printer, I was shocked to discover that each \$9 ink cartridge (#8761), which con-

(continues)

Key	Code
<Home>	HM
<End>	ED
<Page Up>	PU
<Page Down>	PD
<Insert>	IN
<Delete>	DE
<F1> through <F9>	F1 through F9
<F10>	F:
<Cursor Left>	LT
<Cursor Right>	RT
<Cursor Up>	UP
<Cursor Down>	DN
<Enter>	CR
<Esc>	ES

TABLE 1: PRESS.COM two-letter key codes.

```

10 DEFINT A-Z:CLS:KEY OFF:DEF FNHEX(X$)=VAL("&h"+X$)
20 MSG$="Now testing for data errors...please wait" : GOSUB 190
30 SUM=0:READ LN:IF LN<0 THEN 80
40 READ H$:IF VAL(H$)<0 THEN 70
50 IF LEFT$(H$,1)="*" THEN GOSUB 210 : GOTO 40
60 SUM=(SUM+FNHEX(H$))*2:SUM=(SUM\256)+(SUM MOD 256):GOTO 40
70 READ CKSUM$:IF (SUM MOD 256)=FNHEX(CKSUM$) THEN 30 ELSE GOTO 170
80 MSG$="Press any key except ESC to create "+F$+" : "
90 GOSUB 190 : A$=INPUT$(1) : PRINT : IF A$=CHR$(27) THEN END
100 LOCATE 6,1:PRINT "Working...";
110 OPEN F$ AS #1 LEN=1 : FIELD #1,1 AS BX$
120 READ LN:IF LN<0 THEN 160
130 READ H$:IF VAL(H$)<0 THEN READ CKSUM$:GOTO 120
140 IF LEFT$(H$,1)="*" THEN GOSUB 240 : GOTO 130
150 LSET BX$=CHR$(FNHEX(H$)) : PUT #1 : GOTO 130
160 CLOSE:PRINT:PRINT F$;" has now been created." :END
170 PRINT:PRINT "Error in DATA line";STR$(LN);".";
175 PRINT:PRINT "SUM=";SUM
180 PRINT "Check your work." :BEEP:END
190 CLS : LOCATE 3,1 : PRINT "X-Maker II" : RESTORE : READ F$
200 LOCATE 5,1,1 : PRINT MSG$; : RETURN
210 ZZ=VAL(MID$(H$,2)) : FOR I=1 TO ZZ
220 SUM=SUM*2 : SUM=(SUM\256)+(SUM MOD 256)
230 NEXT : RETURN
240 ZZ=VAL(MID$(H$,2)) : FOR I=1 TO ZZ
250 LSET BX$=CHR$(0) : PUT #1 : NEXT : RETURN

```

LISTING 1: X-MAKER2.BAS, *.*'s program-making program

```

1000 DATA "press.com"
1010 DATA 1,E9,80,*129,33,-1,09
1020 DATA 2,C9,26,8A,0E,80,00,49,7E,32,BE,81,00,E8,3B,00,83,-1,CC
1030 DATA 3,F9,1E,76,03,89,1E,00,BE,03,01,88,40,00,8E,C0,BF,-1,C1
1040 DATA 4,1E,00,26,89,3E,1A,00,26,89,3E,1C,00,FC,51,F3,A4,-1,FC
1050 DATA 5,59,26,03,0E,1C,00,26,89,0E,1C,00,88,00,4C,CD,21,-1,6B
1060 DATA 6,83,C7,02,83,C6,02,05,02,00,C3,BF,03,01,33,C0,33,-1,32
1070 DATA 7,DB,3B,C1,76,03,E9,DD,00,80,3C,22,75,05,E8,DC,00,E8,-1,F8
1080 DATA 8,EF,80,3C,7E,75,05,E8,E8,00,EB,E5,80,3C,46,75,05,-1,59
1090 DATA 9,E8,ED,00,EB,DB,81,3C,4C,54,75,09,C7,05,00,4B,E8,-1,4A
1100 DATA 10,BD,FF,EB,CC,81,3C,52,54,75,09,C7,05,00,4D,E8,AE,-1,36
1110 DATA 11,FF,EB,BD,81,3C,55,50,75,09,C7,05,00,48,E8,9F,FF,-1,A8
1120 DATA 12,EB,AE,81,3C,44,4E,75,09,C7,05,00,50,E8,90,FF,EB,-1,09
1130 DATA 13,9F,81,3C,48,4D,75,09,C7,05,00,47,E8,81,FF,EB,90,-1,89
1140 DATA 14,81,3C,45,44,75,09,C7,05,00,4F,E8,72,FF,EB,81,81,-1,DA
1150 DATA 15,3C,50,55,75,0A,C7,05,00,49,E8,63,FF,E9,71,FF,81,-1,1F
1160 DATA 16,3C,50,44,75,0A,C7,05,00,51,E8,53,FF,E9,61,FF,81,-1,5E
1170 DATA 17,3C,49,4E,75,0A,C7,05,00,52,E8,43,FF,E9,51,FF,81,-1,D9
1180 DATA 18,3C,44,45,75,0A,C7,05,00,53,E8,33,FF,E9,41,FF,81,-1,91
1190 DATA 19,3C,43,52,75,0A,C7,05,0D,00,E8,23,FF,E9,31,FF,81,-1,96
1200 DATA 20,3C,45,53,75,0A,C7,05,1B,00,E8,13,FF,E9,21,FF,46,-1,F8
1210 DATA 21,40,E9,1C,FF,81,EF,03,01,8B,CF,C3,46,40,80,3C,22,-1,4C
1220 DATA 22,74,0D,3B,C1,74,09,8A,1C,89,1D,83,C7,02,EB,EC,46,-1,A5
1230 DATA 23,C3,46,40,8A,1C,80,E3,1F,89,1D,83,C7,02,46,40,C3,-1,A8
1240 DATA 24,46,40,8A,1C,80,EB,30,7C,0E,80,FB,0A,7F,09,80,C3,-1,06
1250 DATA 25,3A,88,3D,47,88,1D,47,46,40,C3,-1,CF,-1

```

LISTING 2: Merge PRESS.DAT's DATA lines with X-MAKER2.BAS (LISTING 1) to create PRESS.COM using BASIC.

tains about 4 milliliters of fluid, lasted for only 25 to 30 pages in NLQ mode. At that rate, printing a few hundred pages would cost a small fortune, and I feared I had bought a white elephant.

After searching everywhere for an inexpensive replacement and rejecting several pen inks that were laced with lacquer to make them dry quickly, I hit upon the perfect solution: water-based Sheaffer Skrip jet black fountain pen ink. To make a device for injecting ink into the printer's reservoir, I cut off and rounded the tip of a syringe. Since then, I've been using my cheap refill ink regularly with no problems. Even when the printer sits idle for weeks, it prints without missing a dot. If you find another substitute ink, make sure it doesn't dry out or clog up under normal conditions.

The savings from this solution are terrific. A 60-milliliter bottle of Sheaffer ink costs about \$2. The equivalent 15 Epson cartridges would run a whopping \$135! I hope this tip will make other LetterJet owners as thrifty—and as happy—as I now am with my printer.

Roger D. Peugh
Winona Lake, Indiana

Editor's note: It's illegal in some states to purchase a hypodermic syringe without a prescription. But if you're on good terms with a local pharmacist or family physician, you may be able to obtain one without a needle. If not, look in a drugstore for a needleless infant's medicine syringe, such as the Apex Medical Corporation's Oral Syringe, which is sold over the counter. Veterinarians and pet supply stores also carry needleless syringes.

Our Nom de Plume, Perhaps?

I've discovered an alternative to this column's namesake, the familiar DOS wild-card specification, *.*. In most DOS commands, you can save two key-strokes by instead typing a plain period, which also means "all files in the current directory." For example, COPY A:. is identical to COPY A:*.*, and DEL . is the same as DEL *.*. (One caveat: In DOS versions before 3.0, the trick won't work in the root directory. There, you can use a backslash instead of a period.) Perhaps you should rename your column just plain Dot?

Steven Stewart
Moncton, New Brunswick,
Canada

*Editor's note: Technically, a single period stands for the name of the current directory. The trick works because DOS commands like DEL let you specify a directory name as a shorthand way to operate on all files in that directory. Its use, however, is not exactly equivalent to *.* and can cause damage. For example, issuing the command COPY . will not generate the error message 'File cannot be copied onto itself' but will instead cause files to copy onto themselves, destroying any that are larger than 64K. COPY does not recognize that .\filename and filename designate the same file.*

Another little-known shorthand reference is double dot (..), which represents the parent directory. Thus, the command DIR .. lists the files in the parent of the current directory, and DEL .. deletes them. As for our

name, we'll keep our lucky stars, but thank you very much.

No Runs, No Hits, No ERRs

In "To ERR Is Inhuman" [*Star-Dot-Star*, PCW, September 1988; see also "ERRor Correction," *Star-Dot-Star*, PCW, January 1989], Leon Chalnicks describes a macro for eliminating 1-2-3 spreadsheet ERRs. Another method I've found helpful is to copy the statement @IF(@ISERR(formula),0,formula) down a column.

This returns zero in each cell if the formula evaluates to ERR; otherwise, it returns the result of the formula, which you can replace with any valid expression. The result can be used as an element in other calculations referring to the cell. Another technique is to use a similar statement to refer to a different cell. @IF(@ISERR(B5),0,B5) returns zero if B5, or any other specified cell, contains ERR, or the contents of B5 if it doesn't.

Dan Ayala
Palo Alto, California

Editor's note: To strip NA messages from cells, replace @ISERR with @ISNA.

DEVELOPER'S TOOLBOX

Conventional Surprises

Dozens of new and improved software tools sparkled brightly amid the glitz and glitter at Fall COMDEX in Las Vegas. There were a few surprises, too. For instance, John Otken, developer of the assembler Optasm, gave me an eye-popping advance look at his new linker, *Optlink*, and new debugger, *Optdebug*, which will

be available soon from SLR Systems. The debugger features a clever command that lets you work backward through a program, undoing the effects of previously executed machine code step by step. Other planned Optasm features include 80386 support, faster assembling speed, and teaser versions of *Optlink* and *Optdebug*, making this product worth serious consideration.

Speaking of assembly language, Bruce Barrington and Gary Liming of Clarion Software told me that programmers are now hard at work converting the Clarion language from Turbo C to pure assembly code. The finished effort should add an extra helping of speed and reduce disk space requirements for the company's easy-to-use, menu-driven data base-development systems. An impressive demo made clear to me that for getting data base applications up and running in a hurry, *Clarion* is a dream.

There were new tools for high-level-language programmers, too. Despite a feeding frenzy at a nearby bowl of Hershey's Kisses, I managed to follow a demo of a fascinating new program design tool, *Logic Gem* from Sterling Castle. The basic idea behind *Logic Gem* is simple. You plug in logical statements and select a language. Moments later, you receive a source code listing optimized for the decision rules you supplied. Output choices include C, structured BASIC (for example, Turbo Basic and QuickBASIC), interpreted BASIC, Pascal, FORTRAN, dBASE, and English (useful for documenting your code). The program is especially good at cutting through a complex forest (*continues*)

of nested decision trees, ensuring the logical consistency of multiple IF...THEN...ELSE statements. Serious programmers must get *Logic Gem*. It's a jewel.

Nonprogrammers who need to build DOS menus quickly should pick up *Menu Blocks* from Bridgeway Publishing. The product isn't new, but its well-designed character graphics commands make building custom menus fast and easy. (Another recommendation: The company makes *Fast-Trax*, a *PC World* Best Buy.) Also, because *Menu Blocks* maintains an internal PATH variable, using the program can eliminate PATH commands in AUTOEXEC.BAT and other batch files. For designing turnkey systems, *Menu Blocks* belongs in every developer's bag of tricks.

Likewise, for applying the finishing touch of on-line documen-

tation, all systems developers should be pleased with the features in new releases of *PDQ-Help*, a text-only version, and *PDQPlus*, which includes graphics support. These programs help build context-sensitive pop-up text files that can hold 100,000 keywords, with as many as 1200 lines of associated text per word. For personal programming references, you can order prepackaged files for Greenleaf C and Lahey FORTRAN tool kits. And you can freely distribute a supplied *PDQHelp* run-time module for adding on-line documentation to your own software. Best of all, *PDQHelp*'s resident module occupies a thrifty 29K. *PDQPlus* takes up only 39K. If you're seeking an on-line help system, look no further.

Discovering these and other tools at COMDEX meant hiking an estimated 36 total miles of aisles at eight locations, but I'm glad to say the trip was worth every step. New developer's tools promise an exciting future for software and systems designers. What's more, my research provided an unexpected health benefit—with all that walking, I lost three pounds!
—T. S.

Tom Swan is the author of Mastering Turbo Pascal 4.0 (Howard W. Sams, Indianapolis, Indiana, 1988) and the forthcoming Mastering Turbo Assembler (Howard W. Sams).

To send correspondence or to submit material for publication in this column, please see How to Contact PC World, page 4. ●

WHERE TO BUY

Clarion Personal Developer

Clarion Software
150 E. Sample Rd.
Pompano Beach, FL
33064
800/354-5444,
305/785-9172 (BBS)
List price: \$169
Requirements: 512K,
DOS 2.1 or later version
Not copy protected
Technical support:
no toll-free number,
M-F 8:30-5
Other support services: 24-hour BBS
(300/1200/2400 bps)
For more information,
circle 630 on reader
service card.

Clarion Professional Developer

Clarion Software
List price: \$695
Requirements: 512K,
DOS 3.1 or later version

Not copy protected
For more information,
circle 631 on reader
service card.

Logic Gem

Sterling Castle
702 Washington St. #174
Marina del Rey, CA
90292
800/722-7853,
800/323-6406 California,
213/453-7705 (BBS)
List price: \$198
Requirements: 640K,
DOS 2.0 or later version
Not copy protected
Technical support:
free, unlimited, no toll-
free number, M-F 9-5
Other support services: 24-hour BBS
For more information,
circle 632 on reader
service card.

Menu Blocks 2.0

Bridgeway Publishing
Corp.
2165 E. Francisco Blvd.
#A1
San Rafael, CA 94901
415/485-0948
List price: \$79.95
Requirements: 16K
(with Help System load-
ed), DOS 2.1 or later
version
Not copy protected
Technical support:
free, unlimited, no toll-
free number, M-F 8-5
Other support services: none
For more information,
circle 633 on reader
service card.

Optasm

SLR Systems
1622 N. Main St.
Butler, PA 16001
800/833-3061,
412/282-0864

List price: \$125
Requirements: 128K,
DOS 2.0 or later version
Not copy protected
Technical support:
free, unlimited, no toll-
free number, 9-5 M-F
Other support services: BBS
412/282-2799, BIX
For more information,
circle 634 on reader
service card.

Optdebug

SLR Systems
List price: \$125
Requirements: 256K,
DOS 2.0 or later version
For more information,
circle 635 on reader
service card.

Optlink

SLR Systems
List price: \$125
Requirements: 256K,
DOS 2.0 or later version
For more information,
circle 636 on reader
service card.

PDQHelp

Leverage Software
6601 Little River TnPk.
#400
Alexandria, VA 22312
800/344-2322,
703/642-0818
List price: \$59.95
Requirements: 29K,
DOS 2.0 or later version
Not copy protected
Technical support:
unlimited, free, toll-free
number, M-F 9-5
Other support services: none
For more information,
circle 637 on reader
service card.

PDQPlus

Leverage Software
List price: \$295
Requirements: 39K,
DOS 2.0 or later version
For more information,
circle 638 on reader
service card.

How Farsighted Executives Are Using Their PC's For The Fun Of Profit.

By William J. Spink

For years now you've been hearing about the wonderful things personal computers will do for The Executive of the 80's—at least in theory.

But what's the *reality*? Can a PC help you enjoy your work more and show a greater profit, here and now? According to your peers, the answer is "yes."

"With just a few keystrokes," says Al Lynch, Director of Corporate Planning and Research for JCPenney Company, "I can screen companies, find possible acquisitions or 'scope-out' competitors. It's a real competitive edge."

Walt Casey, V.P. of Communications at ConAgra says, "I spend a lot of time each day poking into this and tracking that. It's *much* easier when you can immediately get the facts from a computer, rather than having to make a series of phone calls."

"One of Dow Jones News/Retrieval's services, QuickSearch, is a Godsend," adds Jim Posner, a respected retail consultant. "It gives me detailed corporate reports within minutes—I don't even have to leave the office."

Instant information: the executive advantage.

To lead in today's marketplace, you need information like *that*," Lynch says, snapping his fingers.

He recalls an example of how Dow

Jones News/Retrieval®—the business and financial information service from Dow Jones & Company, Inc.—gave JCPenney Company a real advantage.

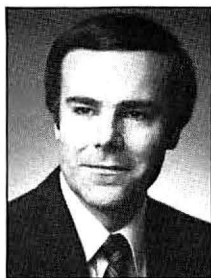
"Let's just say that a 'major player' in our industry was being acquired. Within a few hours we knew more about the take-over candidate than the bidder did. Honestly, we knew more than some investment bankers did."

Decision-making with the leading edge.

"Then we started getting the corporate insider trading data," Lynch continues. "It showed us some things that influenced a major deal."



Al Lynch
Director of Planning
and Research,
JCPenney Co.



Walt Casey
Vice President,
Corp. Communications,
ConAgra, Inc.



James Posner
President,
James Posner
Assoc. Ltd.

"This service really makes a difference in the day-to-day running of your business. It can pay for itself very quickly!"
Surprisingly easy.

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"No problem," according to Posner.

"There's no difficulty using the service. I ask for pointed, specific information and get exactly what I need. It's much easier than manual research."

Walt Casey agrees. "Dow Jones News/Retrieval is simple enough for anyone who's at all comfortable with computers to use it effectively from their very first day online."

Making the right decision.

There are hundreds of online information services, many offering business data. How can you pick the best one?

"It was apparent from the first step that the most useful system was Dow Jones News/Retrieval," remembers Casey. "It offers so much of the information you're looking for—from general news and stock quotes, to data on our company and industry. It was the best single source."

"I've had other services, but Dow Jones News/Retrieval has the most useful business information in the right form," says Posner. "The time I spend 'playing' on the computer makes more money for me—and for my clients."

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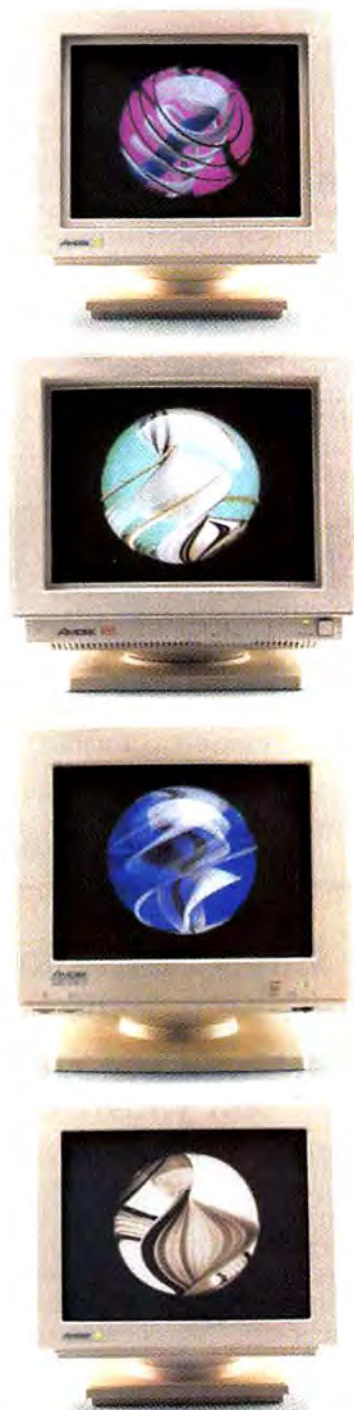
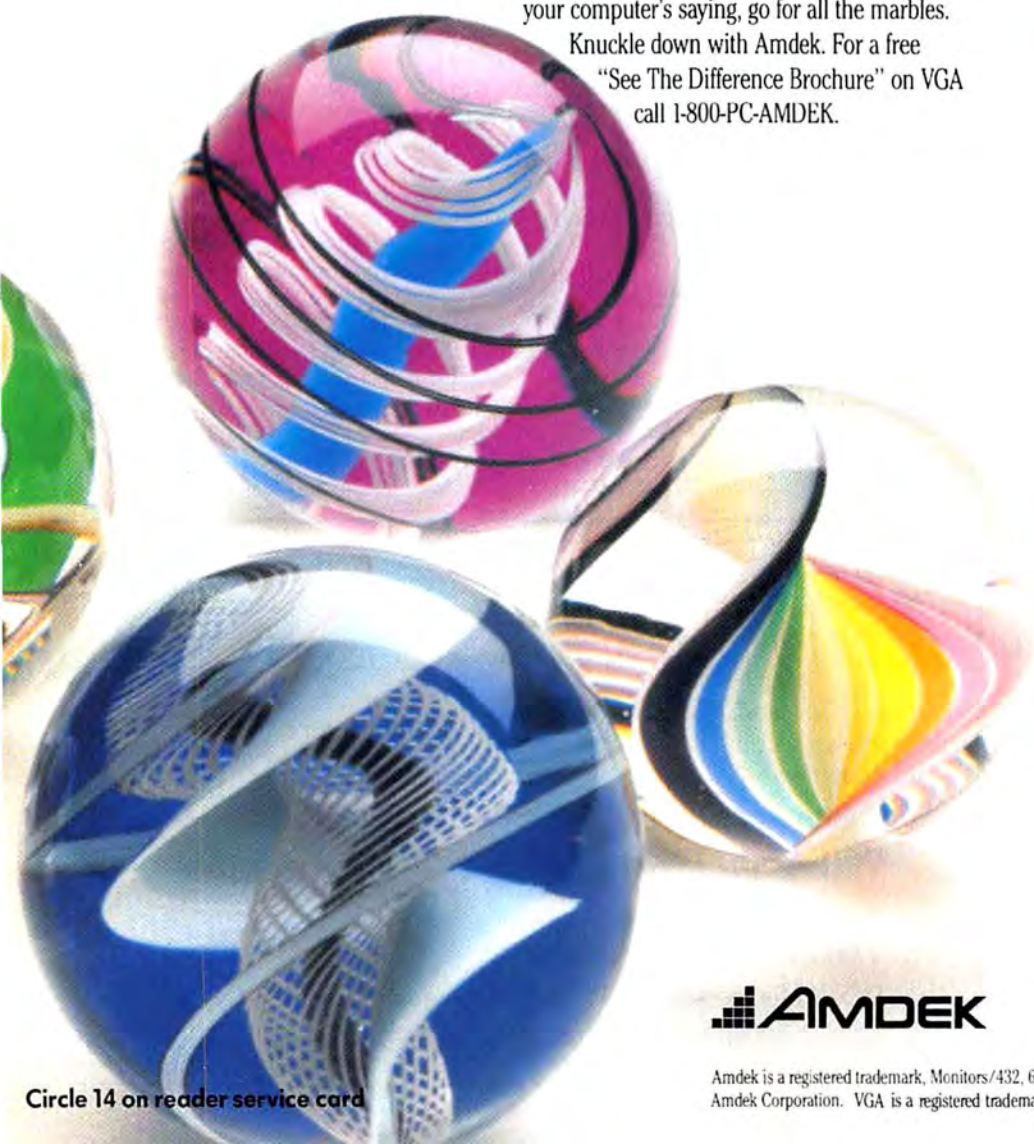
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NETWORK Q & A

Tips and strategies for departmental networking

PC World launches a new column devoted to LAN users and asks the question, What network operating system is right for you?

David
Ferris

Communication is the bedrock of business success. Fail to listen to your customers, and you'll quickly find yourself staring at a shriveled bottom line. Fail to communicate in your department, and projects can quickly run aground. To keep work groups and companies in sync, more and more businesses are turning to local area networks.

Yet there's no productivity gain without pain. For most people, linking PCs together into even a small LAN can be a titanic challenge. Just deciding what to buy can keep you up nights: Should I go with Novell or 3Com? Should I opt for ethernet or token ring adapter cards? Can I use a Deskpro 386 for a server? Must I run multiuser software, or will single-user applications do? And what about integrating PCs, Macs, and Wangs on a growing network? Or linking up to a LAN on the third floor or the VAX across the hall?

Network Q&A is designed to answer just such real-world questions from readers. Each month the column will provide nitty-gritty guidance on selecting LAN hardware and software, help readers unravel network snafus, and supply tips for efficient day-to-day operation. Beyond this, *Network Q&A* will report on new products and trends and shed some light on new technologies.

Network Q&A should be useful to anybody involved with LANs, whether you're a novice

user wondering how to work with a shared laser printer; or an experienced MIS pro evaluating new server technology. However, the column is aimed primarily at first-time LAN administrators of small to medium-size networks, and the managers who work with them.

The column's main charter is to answer your questions. Send your queries to *Network Q&A*, *PC World*, 501 Second St., San Francisco, CA 94107, or electronically to MCI Mail PCWORLD/179-3813. If your question is published, you'll receive \$25.

Q. *What type of LAN operating system should I buy?*

A. By far the most crucial decision you'll make in selecting a network is the choice of a LAN operating system (LAN OS), the software glue that holds a network together. The leading LAN OS products are Novell's *NetWare*, 3Com's *3+*, Sun's *TOPS*, Banyan Systems' *Vines*, and numerous versions of Microsoft's *OS/2 LAN Manager*. Your choice of LAN OS should be guided by what the network will have to do immediately—and over the next three or four years.

Choosing the right LAN OS is critical for two reasons. First, like any operating system, a LAN OS defines a network's
(continues)

character and how easy it is to configure, learn, use, and upgrade. Second, changing your LAN OS is extremely difficult, much trickier than changing wiring, adapter cards, or servers. Switching to a new LAN OS not only involves reinstalling all your applications and resetting user access rights but can mean redesigning front-end menu systems, and more. Imagine switching every PC in your office from DOS to UNIX, and you get the idea.

A LAN OS is a must because DOS doesn't know much about sharing printers, modems, storage, and other resources. The LAN OS controls access to these resources and to data and programs on the server. Depending on the LAN OS, directories can be public (open to all users), shared (open to a select group), or private (assigned to one person). The LAN OS also directs traffic, queuing (or "spooling") print requests from networked users. You can expect a LAN OS to come with utilities such as an E-mail program for exchanging short messages within the department, programs that monitor usage, and so on. Before you buy that dream LAN OS, however, consider some other key factors:

Software Compatibility Before you buy a LAN OS, make sure it supports the *multiuser* applications you want to use. Don't be lulled by a vendor's claim that its LAN OS will run almost any *single-user* program off the shelf. Insoluble incompatibilities can crop up; more to the point, single-user programs lack basic file- and record-locking safeguards. If two people try to open the same file, the entire network can crash. For the surest answer

on LAN OS compatibility, contact the company that sells the multiuser package.

NETBIOS Compatibility Make sure the LAN OS is NETBIOS compatible; these standard networking subroutines are used by many important multiuser applications. Most major vendors support this specification, but it never hurts to ask.

Training If you thought DOS was unfathomable, try using a LAN OS. Logging on to the server, sending an E-mail message, and performing other day-to-day tasks can mean typing reams of obscure commands. To shield users from technical intricacies, your technical staff (or consultant) should create a menu system and convenient batch files, write relevant user documentation, and then give everyone a quick tutorial on using the LAN.

Technical Support Don't base your choice of a LAN OS solely on its price tag. Technical support can be a huge expense; remember, too, that it's easier to find qualified staff for some LANs because of their popularity. If you're running a small TOPS network, you may not need much help. But chances are you'll need some in-house staff as well as third-party consultants, LAN resellers, and LAN OS vendors to maintain multiuser software, develop front-end menu systems, and tackle other thorny tasks. In sum, determine the level of post-sale support you'll want—and the LAN OS's popularity—before choosing a network supplier.

Memory Requirements Find out how much RAM the LAN OS commandeers from networked PCs—you may have to upgrade

some machines. *NetWare* and *3+* usually require that each PC cede from 30K to 70K. TOPS, which lets any PC be a workstation, server, or both, takes more: If a PC acts as either workstation or server, the RAM cost is 120K. If it plays both roles, say goodbye to 190K. Don't forget that menu systems and drivers for LAN adapters also soak up memory.

Security Need to protect payroll records from prying eyes? Should certain employees be allowed to read records but not edit them? If you need this level of control, carefully consider a LAN OS's security features. At the very least, the system should control access to files and records and require users to enter passwords when logging on. LANs that can link to the outside world (remote users, other LANs, and large systems) should safeguard access to modems, fax gateways, and micro-to-mainframe links.

When evaluating security features, keep convenience in mind. *3+* and TOPS users must enter a password for each shared resource (printer, modem, or server) they access. This approach becomes annoying as a LAN grows in size. With *NetWare*, on the other hand, a single password controls access to all peripherals. *NetWare* can also detect and record unsuccessful log-ons, and automatically force users to change passwords at set intervals.

Lay of the LANs

When selecting your LAN OS, it's crucial that you examine how the network will be used. Most networks fall into three categories—personal LANs, isolated work-group LANs, and power

LANs. Determine which category your LAN falls into and then judge how well a given LAN OS meets its needs.

Personal LANs are limited to ten or fewer PCs and are set up primarily for sharing peripherals and data. Users in a work group can share a printer, swap messages via a basic E-mail program, and move data files over the network. If your LAN fits this profile—and you don't expect it to grow much—TOPS is probably the best choice (see "TOPS—The Low-End Link to Macs" in this issue). Although TOPS can cost as much as an equivalent *NetWare* setup (about \$500 per node), TOPS is much easier to install and use. In addition, it offers the flexibility of *peer-to-peer networking*: Instead of relying on a single dedicated server that holds all shared files and controls all shared peripherals, TOPS lets any node act as server or server/workstation. This scheme allows shared hard disks and peripherals to be situated throughout the office. TOPS's Achilles' heel? Its limited password-based security and lack of centralized administration tools—critical features if the LAN has to grow.

Isolated work-group LANs are typically single-server setups that support between 10 and 40 PCs, supply considerably more services than personal LANs, and aren't linked to other networks. Typical needs include centralized backup, multiuser data bases, sophisticated E-mail, and a shared library of numerous file types. Although it's tricky to install, *NetWare* is currently the best option in this category, and its popularity assures you of

finding plenty of support software and knowledgeable technicians to tune up the system.

3Com's *3+* can also serve isolated work groups, but it's not as widely supported and may come with more extras than you want. Versions of *LAN Manager* such as IBM's *LAN Server* and 3Com's *3+Open* are also viable options. As more vendors deliver supporting software, these products will become increasingly attractive.

Power LANs are rich multi-user environments that meld hundreds of workstations with other LANs, remote users, and mainframes near and far. 3Com's *3+* and *3+Open* are good bets for power LANs. They streamline internetwork communications and let users access remote servers and peripherals as if they were across the room. The key underpinnings are a *name service*—a distributed system directory that coordinates multiple servers—and *internetwork routing*—a facility that optimizes data exchange with remote LANs.

Banyan's *Vines* is another candidate if you need foolproof security, powerful debugging tools, and top-of-the-line internetwork routing. However, you're on your own for installation and maintenance because vendor support is sparse, and third-party services and applications are few and far between.

Take your time evaluating a network operating system; the success of your LAN—and your department's productivity—will depend on it. Above all, avoid choosing your LAN OS based on a quick poll of what other firms use on their LANs. That approach can be a recipe for disaster. ●

David Ferris is president of Ferris Networks, a San Francisco-based reseller of network products whose services include systems configuration, installation assistance, training, and maintenance contracts. He has worked with PC networks since 1979 and has installed LANs from IBM, Novell, 3Com, and Microsoft at a number of major U.S. corporations.

To send correspondence, please see How to Contact PC World, page 4.

POWER TIP NO. 40

Spell Out dBASE Logical Fields

Tired of explaining what T and F stand for in dBASE III Plus reports? If your dBASE reports often display the contents of logical fields, you'll produce more readable output by using dBASE's IIF() function with the Active expression to substitute words for the logical values.

Suppose you have a file called *Vendors* with a logical field, called *Active*, containing T or F. In a report column, instead of the Active expression itself, use IIF(ACTIVE, "Yes", "No"). You can also use IIF(ACTIVE, "Active", "Inactive").

Alan Schwartz
San Francisco, California

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
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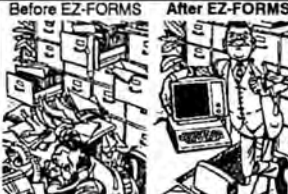


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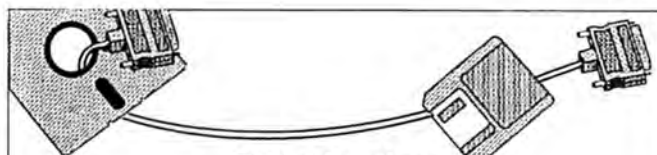
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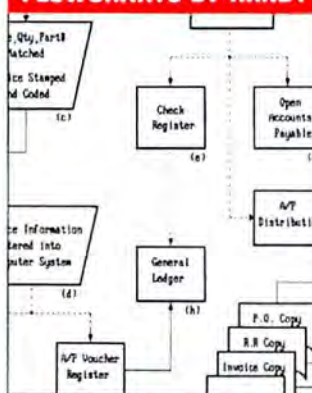
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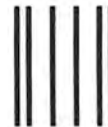
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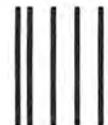
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- 1.** Turn to the Reader Service Card at the back of this issue of *PC World*.
- 2.** Find the Reader Service number of the product you want in the product or advertiser indexes.
- 3.** Circle the number, fill out the postage-paid card and send it in. It's that simple.

In return, our advertisers will send you more information on the products you want. It's just another way that *PC World* helps you make the best buying decisions for your company.

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NEW FROM NSTL
 (National Software Testing Laboratories)
 —the official research facility of
PCWORLD

How to Structure the Ideal MULTIUSER ACCOUNTING ENVIRONMENT.

An outstanding new tool helps simplify the transition.

The trend is clear. Today, business after business is upgrading from single-user to multiuser accounting systems.

To maximize productivity and avoid costly delays, several departments and individuals need to share the same resources. This includes simultaneous access to critical financial data and the ability to run multiple functions concurrently.

The multiuser environment has become essential! Indeed, the sight of a lone bookkeeper tied to one terminal may soon be as archaic as the clerk with an eyeshade and quill pen hunched over a dusty ledger.

But the right product choices must be made—and all the elements must function together efficiently. Three key elements are required: a multiuser accounting software package, a compatible network operating system, and a powerful processor.

NSTL's *Selection Guide to the Multiuser Accounting Environment* can help you make the best decisions.

STAGE 1: The right software.

In a multiuser environment, network functioning and security features are paramount. But not all programs take full advantage of the shared file capabilities of LANs. And security controls may be absent or deficient.

NSTL's *Selection Guide to the Multiuser Accounting Environment* gives you comparative ratings of the leading programs, including *AccPac Plus*, *Macola*, *Platinum*, *RealWorld*, *SBT Accounting Library*, *Solomon III* and others.

We tested each program for:

✓ Audit Trail Performance.

How strong is the integrity of the audit trail? Can you easily verify the numbers on financial statements? Will you waste time tracing business transactions? Can you find backup documentation?

✓ Versatility and Report Generation.

Are the program's features and capabilities sufficient to handle all your company's needs? Are there upgrade options so it can adapt as your organization grows? What reporting formats (predefined and customized) does the program permit?

✓ Usability.

How easy is the program to learn and use? To enter transactions and produce reports? How good is the user interface? What about menu navigation, help features, manuals, tutorials, other training aids?

✓ Data Integrity and Security.

How good are the controls for error handling and system failure? Are there automatic validity checks? How well does the program ensure against unauthorized access? Does it permit individual file and record locking?

STAGE 2: The right network operating system.



LANs are so complex that they challenge even experts.

How many users will the network support? How quickly can transactions be processed? What topologies and network adapters are supported?

Some multiuser accounting programs will not work efficiently on certain networks. What's more, installation and maintenance can prove difficult and frustrating.

We've cut through the confusion and simplified the decision—with detailed tests and comparative ratings of the network operating systems of *IBM*, *Novell*, *3Com* and others.

The *Guide* supplies the results of our exhaustive LAN functionality tests for data protection, administrator utilities, file servers, printer operations and much more.

STAGE 3: The right processor.



To optimize the performance of multiuser accounting software, you need a powerful processor as your file server. A 386-based file server is ideal.

NSTL has run comprehensive tests on the latest 386 models manufactured by *ALR*, *Compaq*, *Everex*, *IBM* and others.

Our data will help you select the right file server—one powerful enough to fully

support your new multiuser accounting system.

Solid recommendations simplify a challenging task.

On the basis of its tests, NSTL has reached firm conclusions on which components are best—and why.

Our superb graphics and "star" rating system let you see at a glance which products are right for your organization's needs. All specifications and prices are included.

So you won't have to guess. You'll know which system is best. You'll have the hard data you need to make a sound, defensible decision. And you'll avoid mistakes that can cause big trouble.

NSTL's *Selection Guide to the Multiuser Accounting Environment* consists of three current, detailed reports in a handsome, durable three-ring binder. The price is just \$95. Your satisfaction is guaranteed.

Remember: for the multiuser accounting environment to work, every element must be right. The stakes are high. A small investment you make today can protect a much larger one. Order this valuable guide now.

For fastest service, CALL TOLL-FREE:
1-800-223-7093

NSTL

National Software Testing Laboratories,
 Plymouth Corporate Center, Box 1000,
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Where does PC WORLD

Answer: to NSTL — America's leading computer

If you need the highest level of comparative data... NSTL's PC Digest is the solution.

Last year, *PC World* designated National Software Testing Laboratories as its official research facility. And for good reason.

NSTL is the leading independent research organization exclusively devoted to testing PC hardware and software. Our knowledge, experience and skilled technical staff enable us to generate analytical data so accurate, comprehensive and meaningful that no one else can match it.

PC Digest is our comparative ratings report on IBM-compatible PCs and peripherals. It's the *authoritative* source for objective, scientific hardware evaluations.

Granted, this unusual publication is not for everyone. But if you need to go *beyond* the ads and the reviews...if you require a *deeper level of analysis*...if your work calls for *complete* and *systematic* data to guide your buying decisions...then *PC Digest* is the only place to turn.

The ultimate hardware reference tool.

Today, the PC marketplace is more crowded and confused than *ever* before.



PC Digest evaluates a wide range of PCs and peripherals.

How can you be *certain* a piece of equipment will prove reliable? That it will do all it claims? That it will be compatible with your existing system? How can you make truly *informed* buying decisions?

There's only one *sure* way to evaluate the hundreds of competitive products. They must be *tested*. Head-to-head. Feature by feature. Against precise, scientific benchmarks. Performing real-world business tasks.

Only *PC Digest* performs this exacting research process. There is no other resource that even comes close.

Every major PC and peripheral is evaluated.

New equipment is a major investment. And, for most organizations, buying PCs and peripherals is a *continuous* process — not a one-time event.



Skilled engineers spend weeks methodically testing each piece of equipment.

PC Digest can help you make the *right* decisions — and *avoid* expensive mistakes. Arriving each month, it's an *ongoing* reference source for a wide range of products. For example:

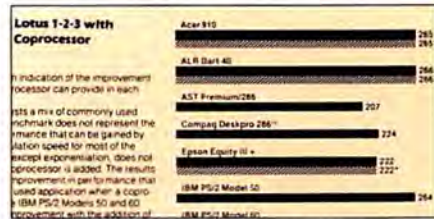
- ✓ IBM and compatible 286 and 386 machines
- ✓ Laptops
- ✓ Modems
- ✓ Laser printers
- ✓ Backup systems
- ✓ VGA boards
- ✓ Monitors
- ✓ Network adapters
- ✓ Memory expansion cards
- ✓ Disk drives
- ✓ Hard disk cards
- ✓ Other mass storage devices
- ✓ Accelerator boards
- ✓ Dot-matrix printers
- ✓ Co-processors
- ✓ Scanners
- ✓ And more

For each product, we determine: How easy is it to set up? What are its features and capabilities? What special system requirements are necessary? How well does it work with major business software? How fast does it perform typical tasks? How good is the documentation? How does it function under DOS and OS/2?

We tell you which products are *best* — and which have *problems*. And we make *specific recommendations* based on the hard data our tests uncover. (Specifications and prices are included.)

Users applaud *PC Digest's* graphic format. Test results are clear, readable and

accessible. Quick-reading charts show how products stack up against each other.



Benchmark test results show how each product scored while running major business software programs.

Couldn't the concrete, research-based data supplied *only* by *PC Digest* help you improve your product selection decisions — and save you time, money and hassles?

Objective, scientific testing standards.

Why is *PC Digest* so widely used — and so highly regarded?

For a start, no one else can equal NSTL's resources. Our laboratory facilities are state-of-the-art. Our staff of skilled engineers and technicians draws upon a wealth of "hands-on" experience that can be gained only by scientifically testing PC products day after day.

PC World announces an innovative partnership.

“*PC World* has entered into an unprecedented arrangement to have our review process conducted by National Software Testing Laboratories... NSTL has the reputation for undertaking the most comprehensive performance and versatility tests of software and hardware products in our industry...They're going to *tell* it like it is — not *sell* it like it is.”

— David Bunnell, Chairman

“We've recognized the increasing need for performance testing that measures products from a real-world perspective...That's why we have selected National Software Testing Laboratories of Philadelphia, Pa. as the exclusive test facility for all products reviewed in *PC World*.”

— Richard Landry, Editor

“*PC World* is proud to include benchmarks and evaluations from the industry's leading source of unbiased product information...NSTL has earned a reputation as the Underwriters Laboratories of the PC industry. Renowned for its exacting, objective methodology, [its] solid reputation has been built by a staff as fastidious as a team of wary tax auditors.”

— Eric Knorr, Senior Associate Editor

go to test equipment?

testing lab.

Performance tests are *applications-based*. We test machines with popular software such as the major spreadsheet and database programs. In contrast, many magazine reviews use misleading "raw processing" benchmarks that bear little relation to real-world business tasks. And the loose-leaf data services, despite their imposing appearance, perform *no* testing at all.

PC Digest is fiercely independent. We have a firm policy of accepting *no ads*. That gives us the freedom to be *fully objective and unbiased* in our product evaluations.

Without vested interests of any kind, we can be *totally impartial*. We're free to print *exactly* what our tests reveal — and we don't pull our punches.

Monthly "Buyer's Alert" keeps you on top.

Selecting equipment is a never-ending process. That's why *PC Digest* monitors the fast-changing PC marketplace on an *ongoing* basis. It keeps you a jump *ahead* of events.

So it's not surprising that *PC Digest* frequently "scoops" the computer industry press. With the *first* comprehensive benchmark tests of IBM's PS/2 line. The *first* tests of the Compaq and IBM 25MHz PCs. And the *first* tests of OS/2's multitasking abilities.

ACCELERATOR BOARD FEATURES	Breakthrough 286		Fasttrack 286		Inboard 386		March 10		PC clone 386-10		Ravecard 286		Speed/PC	
	Y	N	Y	N	Y	N	Y	N	Y	N	Y	N	Y	N
Speeds up IBM PC-1	Y	Y	N	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y	N
Speeds up IBM/XT	Y	Y	N	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y
Speeds up IBM/AT	N	N	Y	N	N	N	N	N	N	N	N	N	N	N
Microprocessor	80286	80286	80386	0096	80386	80286	80286	80286	80386	80386	80386	80386	80386	80386
Memory Cache	16K	8K	64K	8K	N	8K	8K	8K	128K	N	N	N	N	N
On-board memory	N	N	OP1	N	1024K	N	N	N	N	N	N	N	N	N
Computer processor retained	N	Y	N	N	Y	N	N	N	N	N	N	N	N	N
Change Speed	YS	YS	YS	YE	YS	YJ	YI	YI	YI	YI	YI	YI	YI	YI
Change speed without rebooting	YS	N	YS	YE	YS	N	N	N	N	N	N	N	N	N
Change speed within application	N	YK	YK	N	N	N	N	N	N	N	N	N	N	N
Disk caching included	Y	Y	N	N	Y	N	N	N	N	N	N	N	N	N
RAM disk included	N	Y	N	N	Y	N	N	N	Y	N	N	N	N	N
Print spooler included	N	Y	N	N	Y	N	N	N	Y	N	N	N	N	N
Local hard card	SH	SH	I	I	I	I	SH	SH	SH	SH	SH	SH	SH	SH

Which products have the capabilities you want? Our technicians verify each feature.

Each issue includes *Buyer's Alert*. This useful monthly newsletter previews new products and new models...forecasts technology changes and trends...gives you an inside look at vendor policy changes...and much more.

An important plus: With *PC Digest*, everything you need to know is in *one* place. So you don't have to plow through stacks of material searching for the answers you need.

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PRODUCT RATING



Each product receives its own detailed report.

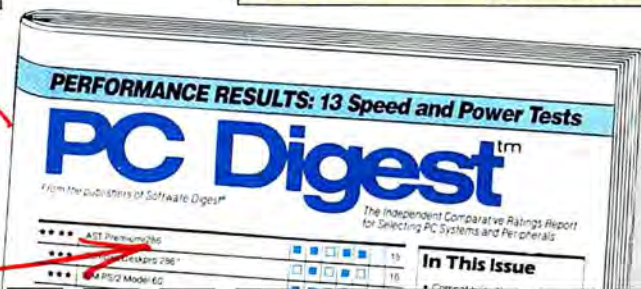
New changes and pressures ahead! Will you be ready?

Warning! The personal computing environment is moving *faster*. The pressures will intensify. Will you be prepared?

Technology is proliferating at dizzying speed. Networking is reshaping the way business functions. The 386 systems and OS/2 will create tough new price/performance decisions.

Expect more competing vendor claims and more hype. New compatibility problems. Product shortages and price increases. In sum, more *confusion* than ever before!

The Master Ratings Chart on each issue's front cover provides at-a-glance comparative data on every product.



Today, with DP budgets tighter, with the new emphasis on documenting computer productivity and bottom-line payoff, every purchasing decision will have to be justified. *PC Digest* gives you the hard data you need to *confirm* your decisions, and *defend* them.

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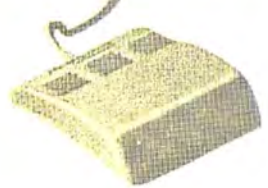
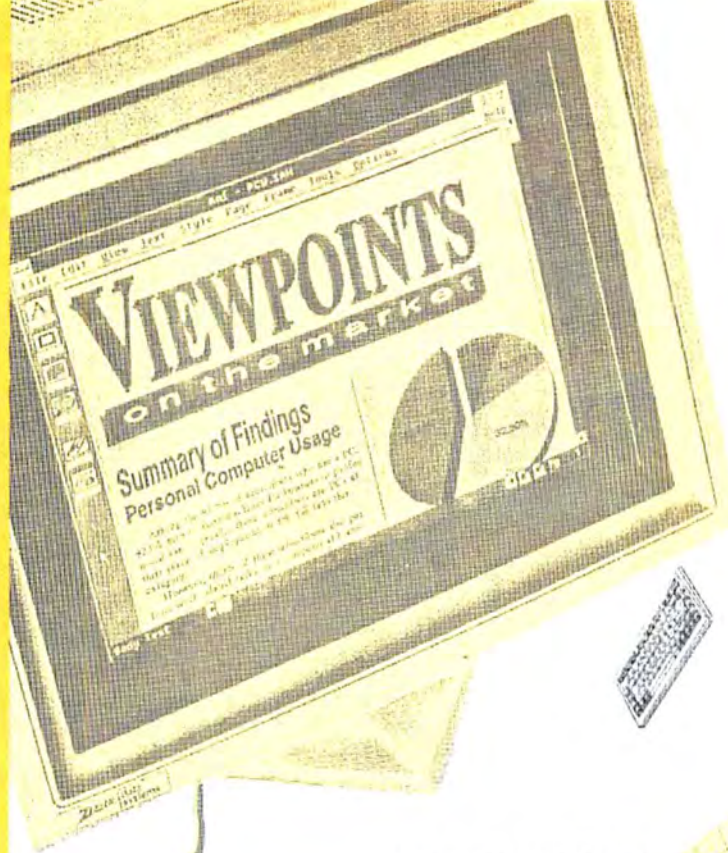
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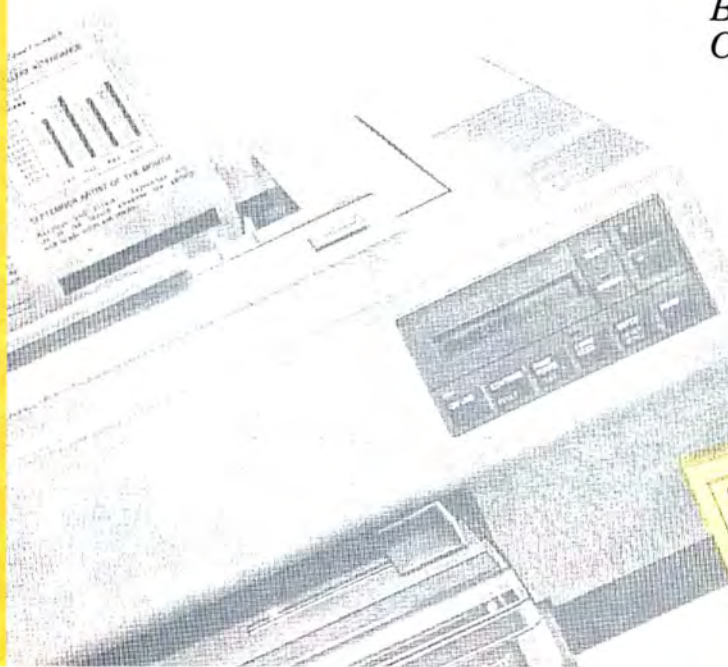
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SPEED:	12MHz/4.77 Switchable	BUILT-IN INTERFACES:	Parallel, 2-RS232 serial, mouse, joystick
BIOS:	Award	EXPANSION SLOTS:	Six 8/15 bit (3 available to user)
BUILT IN RAM:	1MB	MOUSE:	Standard Opto-mechanical
ROM:	32K	POWER SUPPLY:	145 watts 110/220 switchable
EXPANDABLE TO:	3MB		
KEYBOARD:	101 key "PS/2" compatible		
GRAPHICS:	VGA Autosync		
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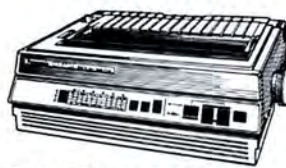
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ML 390 270/90	479.
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ML 393 COLOR	1079.

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- INTEL 8087-3 109.
- INTEL 80287-8 239.
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- H.P. Scanjet w/Interface 1455.
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- MICROTEK MSF 300G 2650.
- MICROTEK MSF 300C Flatbed 1350.
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- LOGITECH Scanman CALL.

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- MOUSE w/Easycad 124.

MODEMS

- THE™ 2400 Internal 99.
- THE™ 2400 External 128.
- THE™ 9600 Internal 379.
- THE™ 9600 External 399.
- HAYES Smartmodem 1200 295.
- HAYES Smartmodem 1200B 295.
- HAYES Smartmodem 2400 433.
- HAYES Smartmodem 2400B 433.
- US ROBOTICS HST 9600 625.

DISK DRIVES

- SEAGATE ST-225 20MB/Kit 279.
- SEAGATE ST-251 40MB/Kit 469.
- SEAGATE ST-251-1 40MB/28MS 435.
- SEAGATE ST-4096 80MB/28MS 625.
- MINISCRIBE 3650 40MB/Kit 377.
- MINISCRIBE 3675 60MB HD/Kit 430.
- MINISCRIBE 6085 71MB/22MS 642.
- PRIAM ID230 230MB/RL/12MS 1975.
- MITSUBISHI 360K 5.25"HH 76.
- MITSUBISHI 720K 3.5" HH 86.
- MITSUBISHI 1.2MB 5.25"HH 93.
- MITSUBISHI 1.44MB 3.5"HH 103.
- SYSGEN Bridge File 3.5" Ext. Drive 225.

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- PLUS DEVELOP. Hard Card 20 545.
- PLUS DEVELOP. Hard Card 40 690.
- WESTERN DIGITAL File Card (30) 419.

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NEC		
P2200	569	339
P5200	799	509
P5300	1049	669
LC890	4799	Call
Okidata		
182 Plus	319	219
320	499	329
390	699	469
393	1499	949
Panasonic		
KXP1080i-2	299	159
KXP1091i-2	329	179
KXP1124	529	309
KXP1595	749	419
KXP1524	949	519
KXP4450	2595	1499
Star		
NX1000	289	169
NX2400	499	309
NB2410	699	429
Toshiba		
P321SL	749	459
P341SL	999	599
P351SX	1499	929

BOARDS

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AST		
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Six Pak Plus 64K	210	119
DTK		
286 10mhz M/B	499	249
XT 1.2mb FDC	79	45
Everex		
1200B Int Modem	149	69
2400B Int Modem	249	129
Genoa		
Super EGA Hi-Res+	399	169
Super VGA #5100	445	239
VGA Hi-Res #5200	645	359
Hercules		
Graphic Card +	299	169
Intel		
8087-2	250	149
80287-10	480	249
Above Board Plus	795	419
Orchid		
ProDesigner	499	299
Tiny Turbo 286	445	269
Twin Turbo 12mhz	645	359
Paradise		
Autoswitch 480	349	Call
VGA Plus	399	259
VGA Plus 16	499	299
VGA Professional	799	Call
Practical Peripherals		
1200B Int Modem	99	65
2400B Int Modem	199	149
Prometheus		
Promodem 2400B	199	129
Promodem 2400G	249	159

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Answering Machine	349	219
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USRobotics		
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1200 Baud External	179	89
2400 Baud Internal	249	119
2400 Baud External	279	149
Video 7		
Fast Write VGA	549	335
Vega Deluxe	379	Call
Vega Vega	499	259
V-RAM VGA	899	469
LAPTOPS		
Megahertz Modems		
2400B Toshiba	299	149
2400B NEC, Epson		
Mitsubishi or Zenith	399	199
Mitsubishi		
MP-286L Dual	3195	1879
MP-286L 20mb	4595	2449
NEC		
Multispeed EL II	2295	1449
Multispeed HD	3695	2249
Toshiba		
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1410 EGA	599	399
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NEC		
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Multisync Plus	1399	869
Princeton		
Max15	389	Call
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Sony		
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Zenith 1490	999	599
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30MB XT Kit #238	699	287
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40MB AT #251-1	999	449
80MB AT #4096	1199	549
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dBXL Diamond	199	105
Foxbase Plus	395	185
Paradox	725	429
Quartz	795	449
RapidFile	295	179
Rbase for DOS	700	419
Reflex	150	90
Q & A	349	179
Desktop Publishing		
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GEM Desktop Pub.	299	169
Pagemaker 3.0	795	Call
PFS:First Publisher	129	69
Publisher's Paintbrush	285	149
Ventura 2.0	895	489
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BPI	Call	Call
Computer Associates	Call	Call
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Dollars & Sense	179	99
Managing Your Money	199	117
Peachtree Complete II	199	149
Turbo Tax 1040	75	42

Graphics

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Deluxe Paint II	105	67
First Graphics	129	Call
Freelance Plus	495	Call
GEM Artline	495	269
GEM Draw Plus	299	165
Generic Cadd Level 3	200	97
Graph Plus	495	299
Harvard Graphics	495	Call
Perspective Jr.	149	85
Integrated		
First Choice	159	Call
Works	149	89
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Windows 386	195	117
Mice		
Logitech C7 Serial/Bus	119	65
Logitech HiRes Bus	150	79
Microsoft Serial/Bus	150	95
Microsoft W/ Windows	200	129
OmniMouse	89	45
PC Mouse II Serial/Bus	149	82
Power Protection		
Curtis Ruby Plus	115	59
Dataseid 85	90	50
Dataseid 100	99	57

Programming

	LIST	FAST
Macro Assembler	150	89
Norton Guides (Specify)	100	58
Turbo Basic	99	60
Turbo C 2.0	149	90
Turbo Pascal 5.0	149	90
Quick Basic	99	60
Quick C	99	60
Spreadsheets		
Allways	150	82
Excel	495	Call
Lotus	495	Call
Lucid 3-D	149	79
Quattro	248	149
Utilities		
CoreFast	149	87
Desklink	170	95
Desqview	130	73
Fastback Plus	189	99
FastTrax	60	37
Formtool	95	54
Laplinc Plus	140	77
Norton Advanced	149	74
PC Tools Deluxe	80	36
Sidekick Plus	195	119
XTree	70	34

Word Processors

	LIST	FAST
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Easy Extra	99	55
GEM First Word Plus	199	117
Grammatik III	89	49
Manuscript	495	Call
Multimate Adv. II	565	247
Professional Write	199	109
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Word Perfect 5.0... \$219
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NEC Multisync GS... \$199
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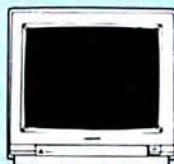
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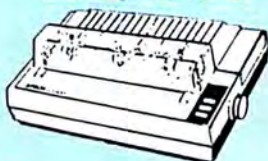
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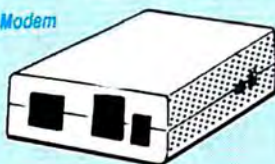
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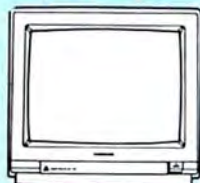
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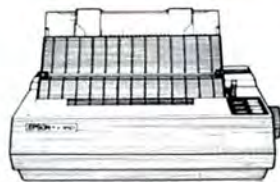
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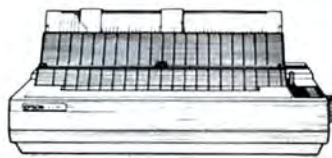
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- With a standard push feed tractor and single sheet friction feed, the FX-850 can handle virtually any type of paper as well as envelopes.
- Exclusive SelectType front control panel puts popular printer features and SmartPark operations at your fingertips.
- The FX-850 prints 264 characters per second (CPS) in high-speed draft mode (12 CPI); 54 CPS in Near Letter Quality mode (12 CPI).



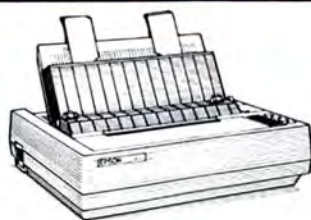
Epson FX-1050

- Wide-carriage 9-pin, dot-matrix printer.
- SmartPark™ a unique Epson paper-handling innovation, lets you switch from fanfold to single sheets or envelopes without removing hardware or paper.
- With a standard push feed tractor and single sheet friction feed, the FX-1050 can handle virtually any type of paper as well as envelopes.
- Exclusive SelectType front control panel puts popular printer features and SmartPark operations at your fingertips.
- The FX-1050 prints 264 characters per second (CPS) in high-speed draft mode (12 CPI); 54 CPS in Near Letter Quality mode (12 CPI).



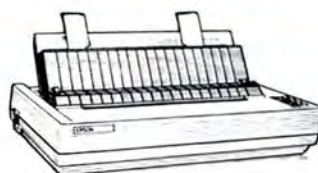
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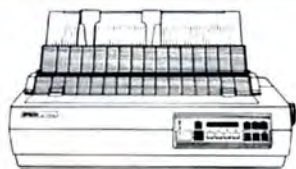
Epson LQ-850

- Epson's 24-pin, dot-matrix technology creates true letter quality characters
- Epson's SmartPark™
- Exclusive SelectType front control panel offers quick, easy selection of popular types, fonts and pitch
- 264 Characters per second in the high-speed draft mode delivers outstanding productivity
- 88 Characters per second in Letter Quality mode for enhanced, high-resolution characters
- In draft mode or Letter Quality mode, the LQ-850 runs at a surprisingly quiet 55 dB noise level



Epson LQ-1050

- Epson's 24-pin, dot-matrix technology creates true letter quality characters
- Epson's SmartPark™
- 264 Characters per second in the high-speed draft mode delivers outstanding productivity
- 88 Characters per second in Letter Quality mode for enhanced, high-resolution characters
- In draft mode or letter quality mode, the LQ-1050 runs at a surprisingly quiet 55 dB noise level
- Exclusive SelectType front control panel offers quick, easy selection of popular types, fonts and pitch



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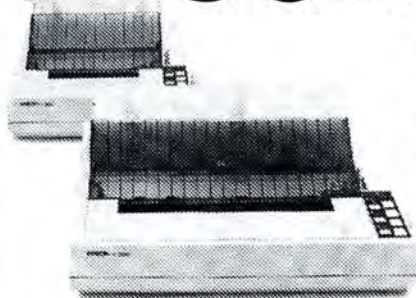
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Let There Be Standards



*Brian
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Get ready—the 486s are coming.

This year we'll see implementations of Intel's 80486 microprocessor, with power greater than some mainframes. Of course, you aren't likely to need that much muscle unless you're the kind of person who's installed a particle accelerator to run physics experiments in your basement.

On the other hand, there's nothing to stop power users with enough change in their jeans from claiming machines of this generation as their new personal standard, as we've seen happen with every previous generation of so-called screamers.

There is one potential threat, however, to the rise of the 486 in computerland. With all this power, makers of new 486 systems will be tempted to customize a feature here or optimize a subsystem there, as happened with 386 memory boards, which differ from manufacturer to manufacturer.

If each system maker—rushing to be first with the fastest—designs disk controllers, communications boards, or video adapters that work only with their own particular add-in slot, the resulting lack of standardization could make buyers keep their wallets in their pockets.

So far, hardware standardization appears to be proceeding

apace. The industry seems to be settling on two bus designs for the 486 generation: the Micro Channel Architecture (MCA) of IBM's PS/2 systems, and the Extended Industry Standard Architecture (EISA). The latter is being supported by dozens of major manufacturers of compatibles, led by Compaq.

But while most of the industry appears to be heeding the call of standardization, there are still disturbing signs that proprietary thinking may rear its ugly head. For example, at last fall's COMDEX, Acer Technology displayed a 386 machine with two new 32-bit slots—not just for memory boards but for other high-speed peripherals as well. These slots are not compatible with MCA or EISA; boards for this supplier's system will not be interchangeable with those from any other manufacturer.

This strategy isn't likely to catch on. But if it does, and more manufacturers go their own way with proprietary gimmicks, the wide availability of interchangeable add-in PC boards that we now enjoy will be significantly diminished.

To encourage manufacturers of 486-based systems to work toward standardization, volume buyers of microcomputer systems have formed a 486 Stan-

dardization Committee. Committee members don't care whether the industry standardizes on a Purple Polka-Dot Architecture, as long as it works.

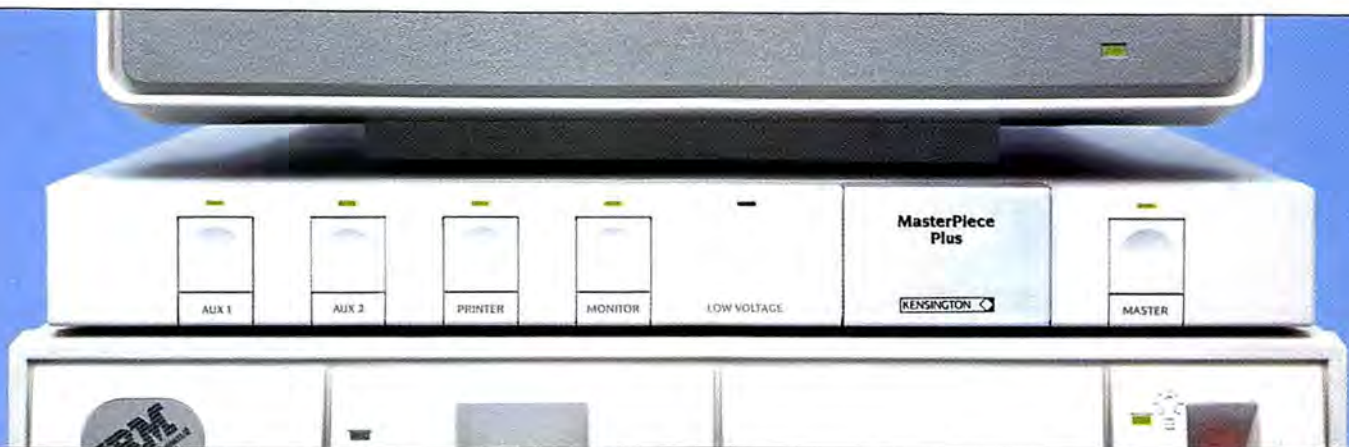
The consensus seems to be that if no single standard will dominate, having two different standards is much better than having no common ground at all. In fact, although MCA and EISA do almost exactly the same things, the competition between them for market share may even result in some benefits to consumers—lower prices, for example.

But the situation bears watching. Even though most vendors seem to be adhering to standards in the 486 generation, the temptation to introduce proprietary technology is always there. I'm sure that locked away in one of Intel's labs somewhere is a team of hotshot engineers—the types who balance their checkbooks in hexadecimal—furiously designing the 586. ●

Brian Livingston chairs the 486 Standardization Committee and is a connectivity specialist for General Electric Consulting Services in New York City.

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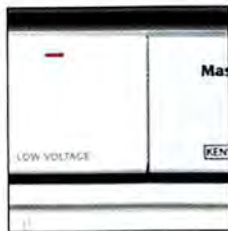


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Curtis products are available nationally from leading Dealers, Distributors, and Retail Chains. In Canada: Personal Computer Assoc. Inc., P.O. Box 235, Ajax, ONT, L1S 3C3, (416) 427-6612

For the Curtis dealer nearest you call (603) 532-4123 Ext. 99

Manufacturing Company, Inc.

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30 Fitzgerald Drive, Jaffrey, NH 03452
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